VOLUME XXIII
NUMBER SIX

THE NATIONAL GEOGRAPHIC MAGAZINE

JUNE, 1912

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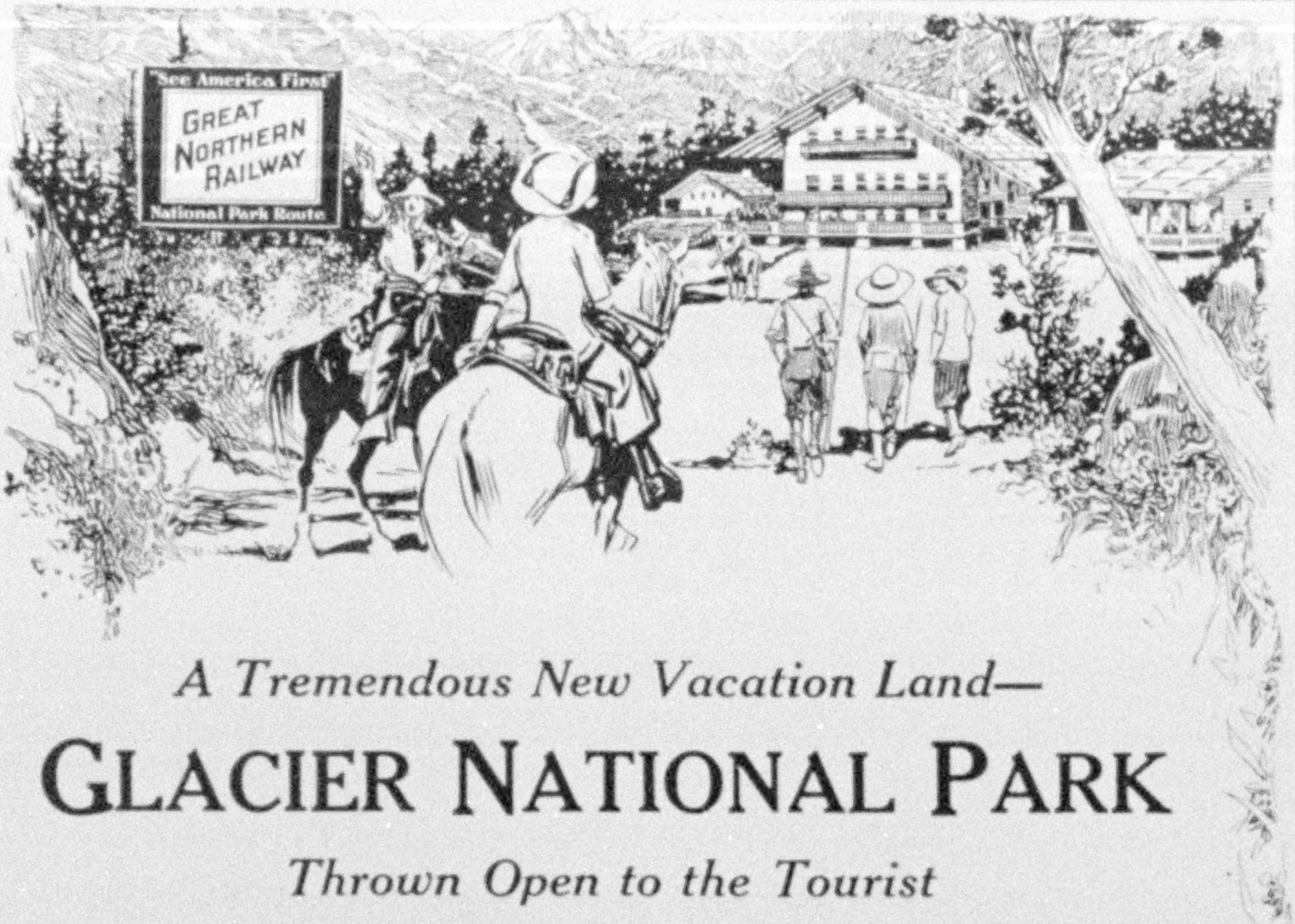

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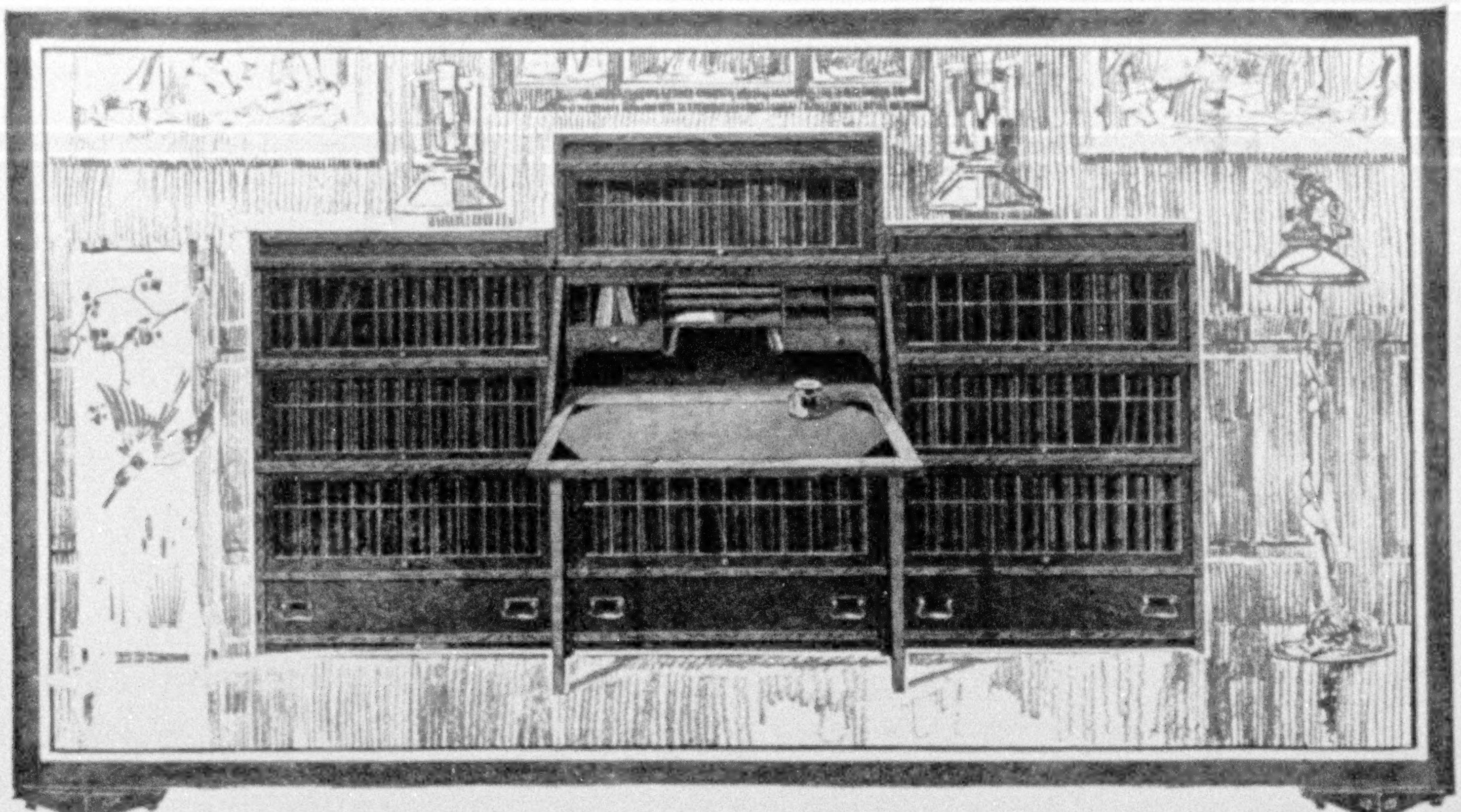

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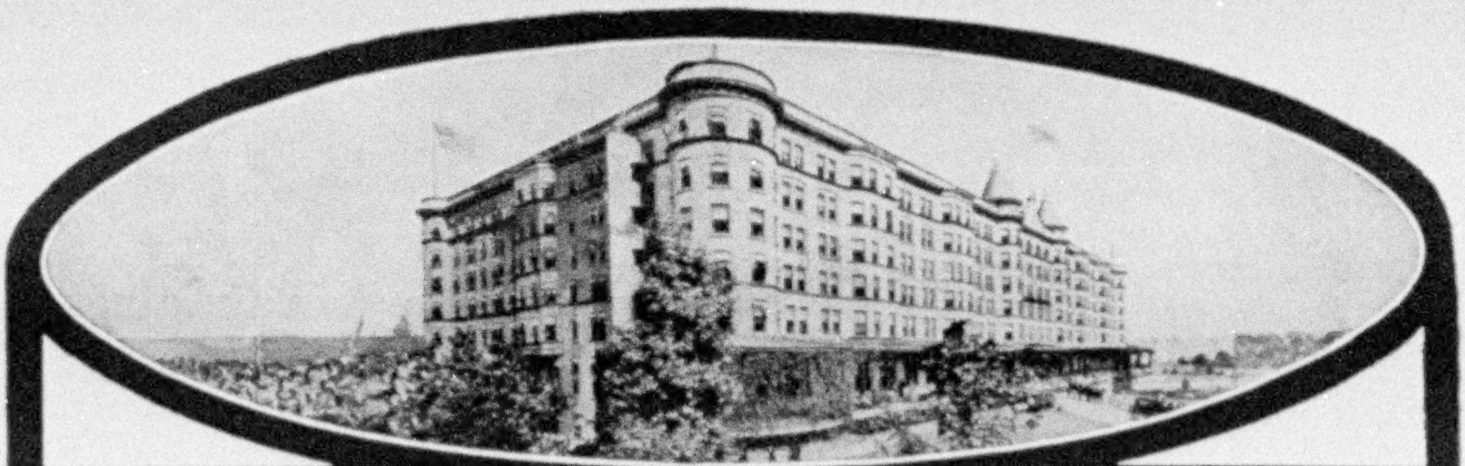

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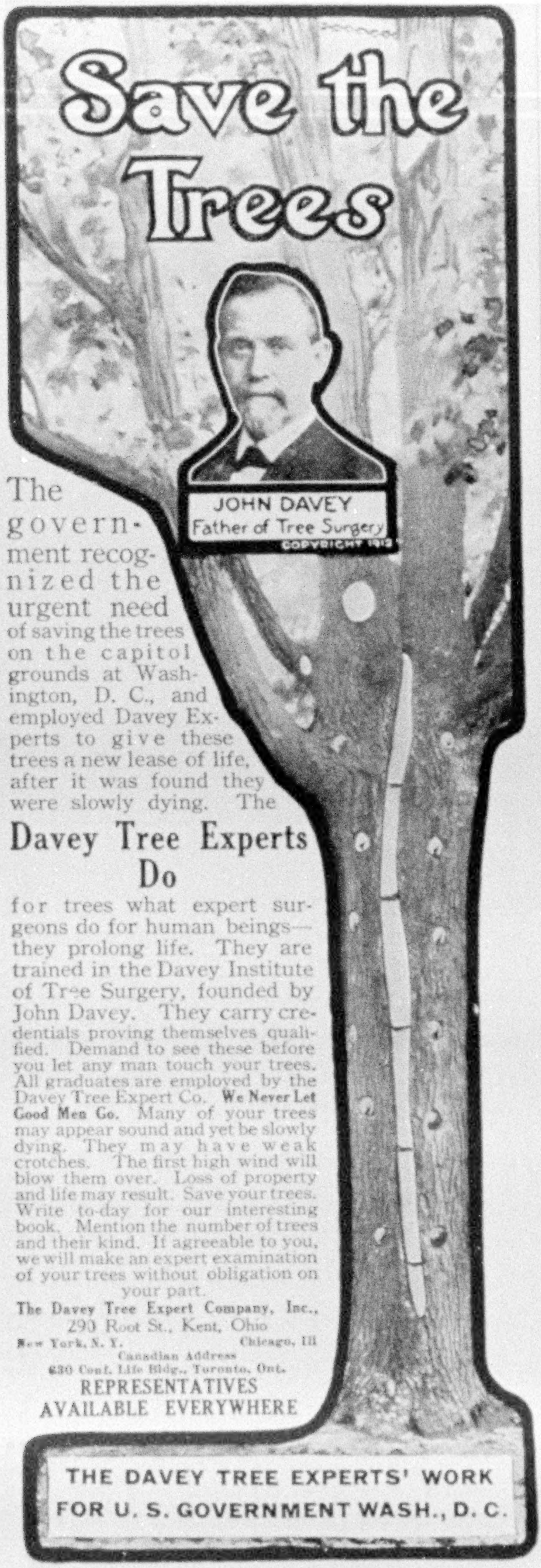

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VOL. XXIII, NO. 6 WASHINGTON JUNE, 1912

THE NATIONAL GEOGRAPHIC MAGAZINE

OUR NATIONAL PARKS

BY L. F. SCHMECKEBIER

IN ELEVEN western States tracts of public land varying in extent from several hundred to over two million acres have been withdrawn from settlement and private exploitation and dedicated by act of Congress as national parks for the benefit and enjoyment of the people.

Within these great reserves may be found scenery and natural phenomena that are unequaled in their majesty and grandeur.

In some of them the traveler may select his method of transportation; he may proceed by coach, on horseback, or on foot; he may stop at the hotels or camps, or he may make his own camp in the solitude of the forest or in the midst of meadows gorgeous with the products of nature's garden.

In other parks the absence of roads compels him to travel on horseback and accompanied by a pack train—and after all this is the best way to enjoy thoroughly the beauties of the mountain and the forest. In all of the parks one is free to come and go as he will, subject only to regulations that look to the protection of the forest and the wild animals.

THE YELLOWSTONE

The oldest and largest of the parks is the Yellowstone, created by the act of Congress approved March 1, 1872. It has an area of 2,142,720 acres, mostly in Wyoming, but with narrow strips on the north and west in Montana and Idaho. The best-known features of Yellowstone Park are the geysers, the Mammoth Hot Springs, and the Great Falls and Grand Canyon of the Yellowstone River.

The geysers are located in three basins—the Norris Geyser Basin near the headwaters of Gibbon River, and the Upper and Lower Geyser basins along Firehole River. Even when the geysers are not in eruption the basins present scenes of weird and singular beauty.

Clouds of steam rise from countless vents; the gaunt trunks of trees, killed by the hot water and bleached to dazzling whiteness, stand specter-like around the edges of the basins; here and there emerald pools or a beautifully colored deposit is seen in sharp contrast to the white sinter which forms the floor.

Of the 84 geysers in the park no two are alike in their characteristics. The Constant Geyser, in the Norris Basin, sends forth graceful jets of water to a height of about 20 feet at intervals of one minute, while the Giant Geyser, in the Upper Geyser Basin, is in eruption at intervals of from five to seven days.

It is Old Faithful, however, which is most regular in its operations. In the 40 years that this geyser has been known to the white man it has never failed to eject its graceful column of water at intervals of 65 minutes.

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Photo by U. S. Geological Survey

OLD FAITHFUL GEYSER: YELLOWSTONE PARK

"In the 40 years that this geyser has been known to the white man it has never failed to eject its graceful column of water at intervals of 65 minutes" (page 531)

Photo by W. S. Berry

WHITETAIL DEER IN ACTION: YELLOWSTONE NATIONAL PARK

Four miles from the northern entrance to the park are the Mammoth Hot Springs terraces, which have been built up by the travertine deposited by the hot waters. From below the glimmering terraces present the appearance of a mass of ice and snow. In places the slope is steep, as if a large portion of it had been torn away; at other points the descent is broken by series of terraces of varying height, the front of each terrace being delicately fluted or molded into the most exquisite tracery.

Impressive as are the terraces from below, the scene from the summit is even more varied and beautiful. To the east is the escarpment of Mount Evarts; to the northwest the crest of Electric Peak stands sentinel at the boundary of the park, while around and below are the brilliantly colored pools which form the outlets of the springs.

The Great Falls and the Grand Canyon of the Yellowstone River present a combination of color and rock sculpture unequaled in beauty and grandeur. For some distance below Yellowstone Lake the river flows peacefully through meadow and forest, but a half mile above the Upper Falls the banks converge and the waters are lashed into foam. At the upper fall the drop is 109 feet. Then follows a few hundred feet of turbulent water, and the stream leaps 308 feet to the bottom of the Grand Canyon, which, writes Kipling in his American Notes, is "one wild welter of color—crimson, emerald, cobalt, ochre, amber, honey splashed with port wine, snow-white, vermilion, lemon, and silver-gray in wide washes.

"The sides did not fall sheer, but were graven by time and water and air into monstrous heads of kings, dead chiefs, men, and women of the old time. So far below that no sound of its strife could reach us, the Yellowstone River ran—a finger-wide strip of jade green. The sunlight took those wondrous walls and gave fresh hues to those that nature had already laid there. Once I saw the dawn break over a lake in Rajputana and the sun set over the Oodey Sagar amid a circle of Holman Hunt hills. This time

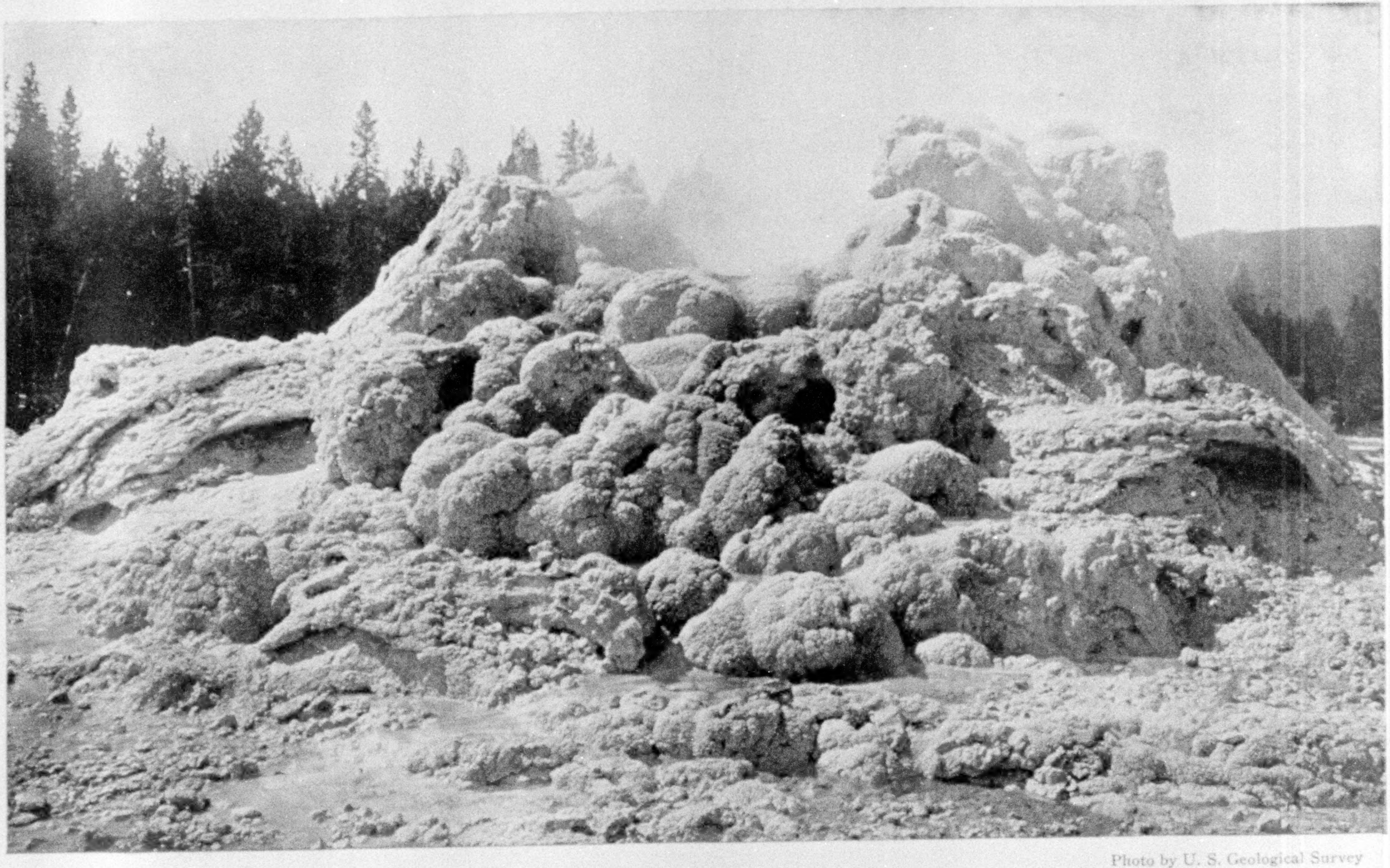
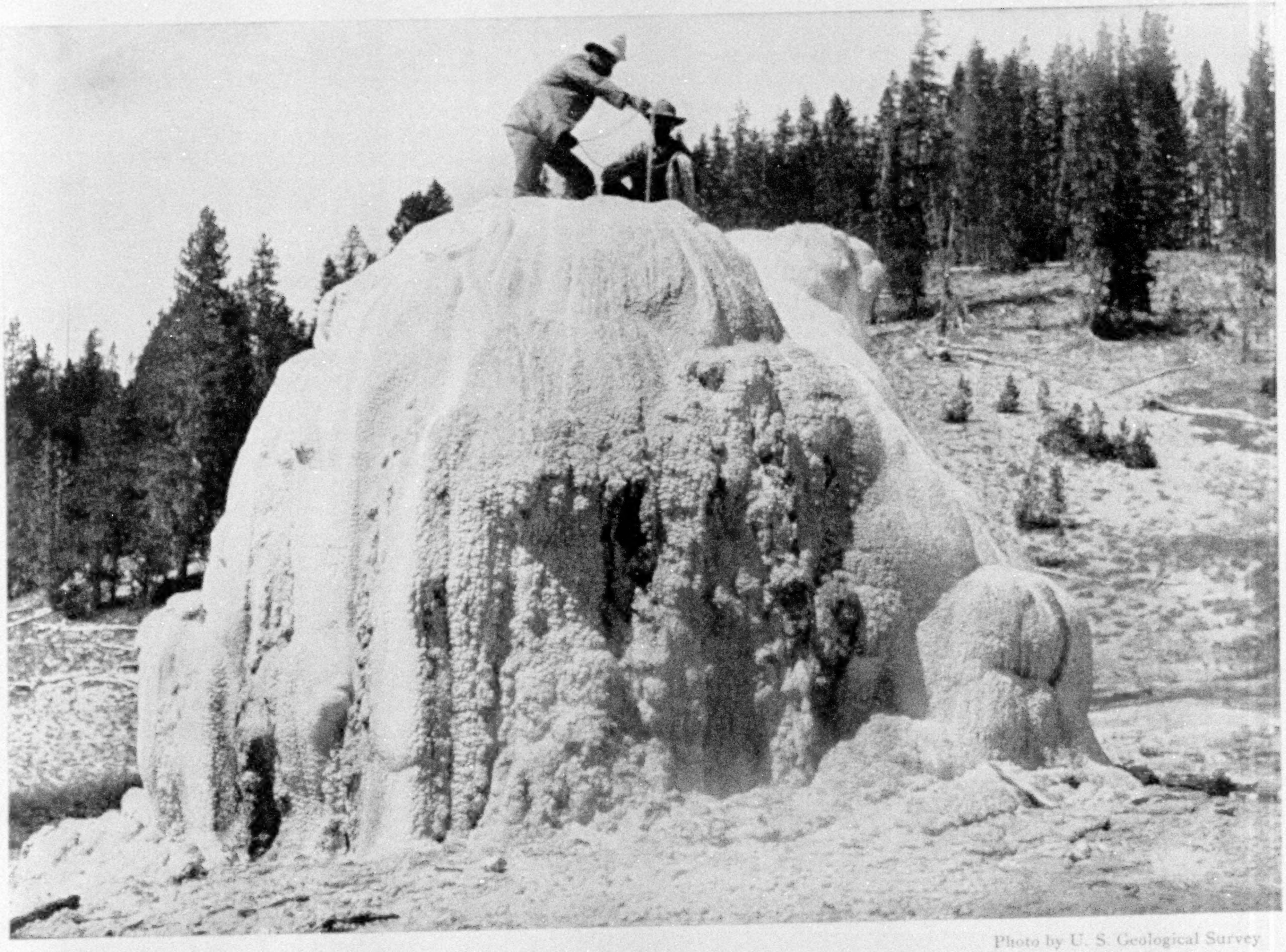


Photo by U. S. Geological Survey

CRATER OF CASTLE GEYSER: YELLOWSTONE PARK

"Of the 84 geysers in the park, no two are alike in their characteristics. The Constant Geyser, in the Norris Basin, sends forth graceful jets of water to a height of about 20 feet at intervals of one minute, while the Giant Geyser, in the Upper Geyser Basin, is in eruption at intervals of from five to seven days" (page 531).



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LONE STAR GEYSER: YELLOWSTONE PARK

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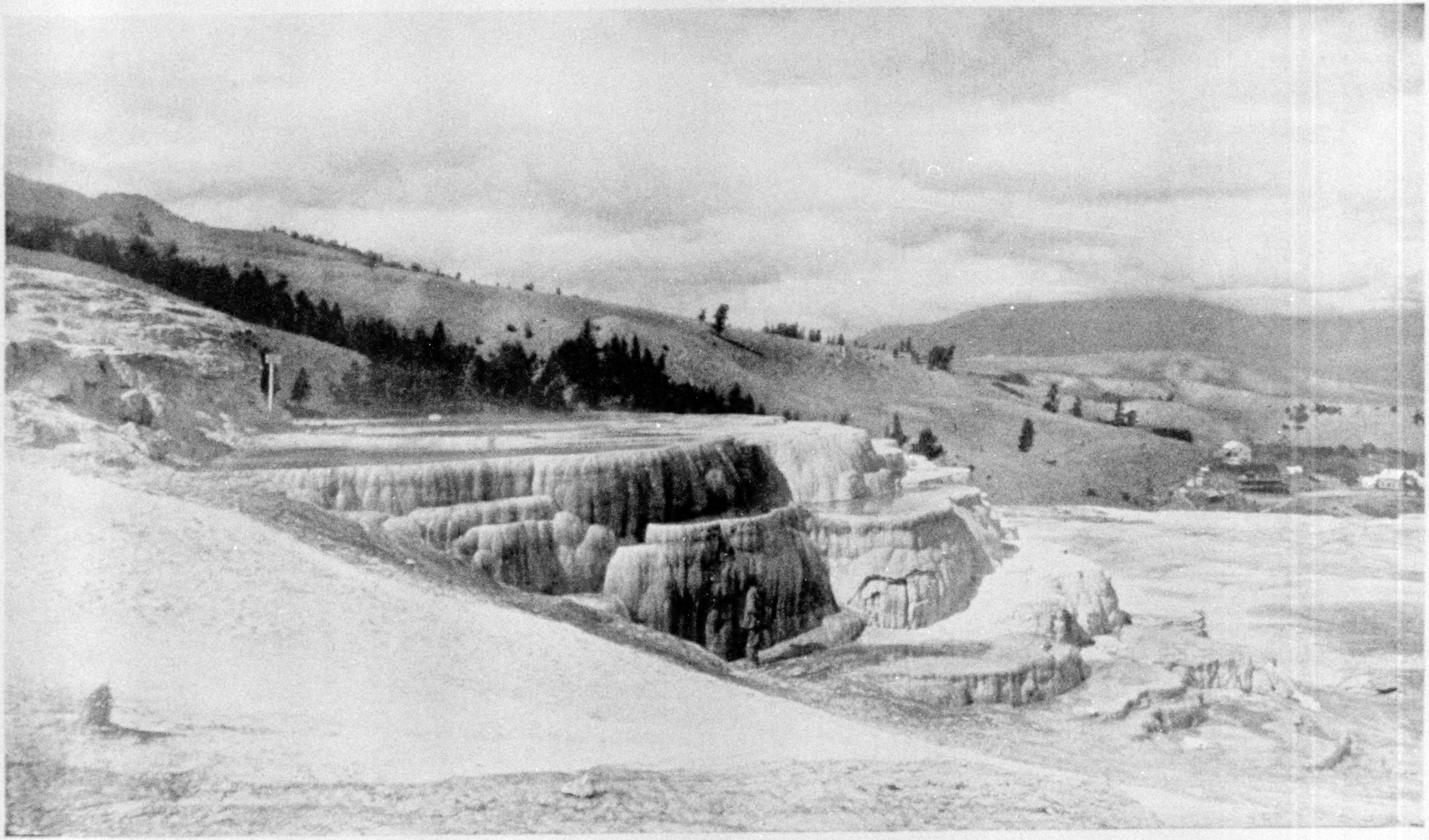

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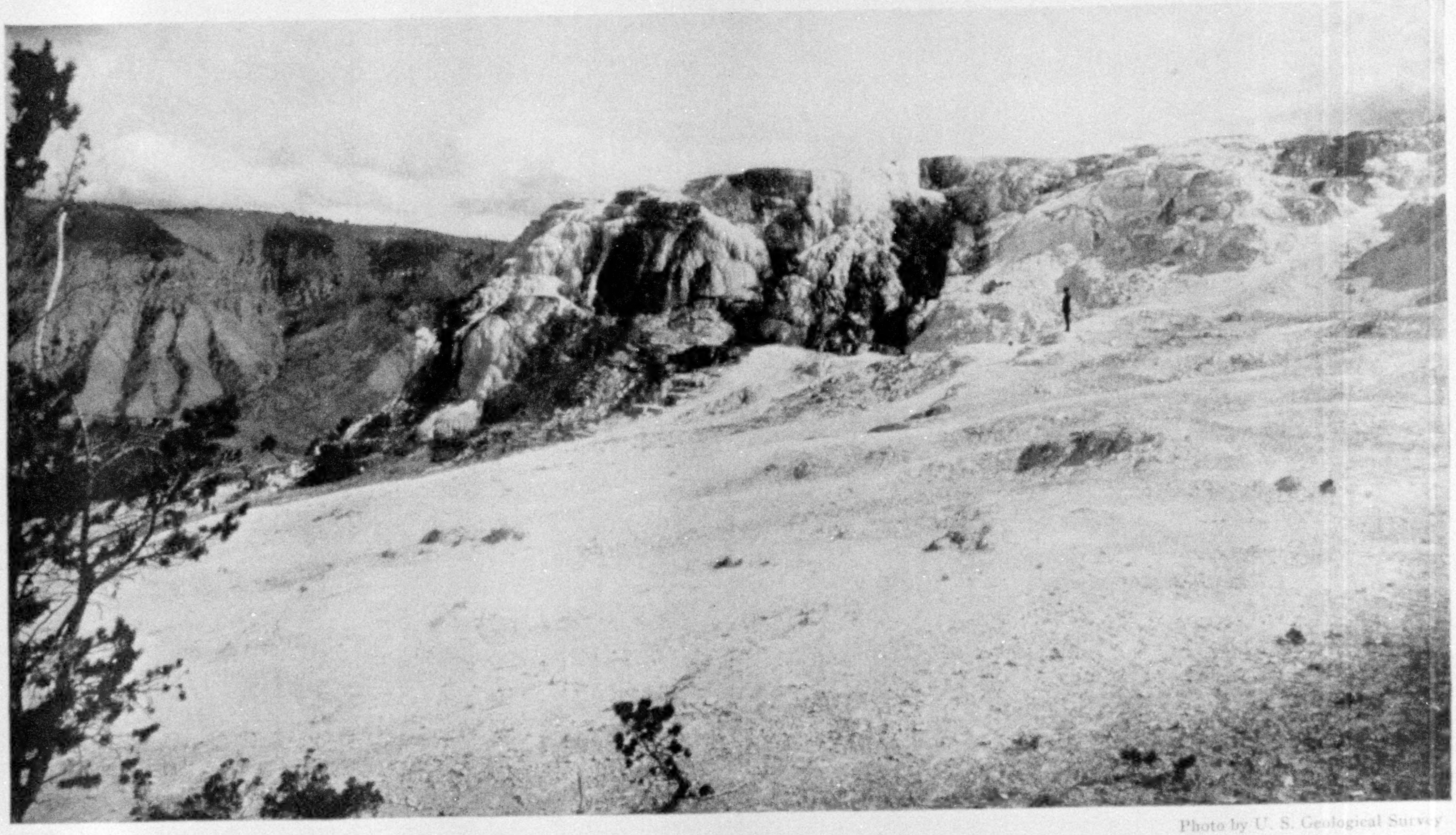
MINERVA TERRACE: MAMMOTH HOT SPRINGS, YELLOWSTONE NATIONAL PARK

"Four miles from the northern entrance to the park are the Mammoth Hot Springs terraces, which have been built up by the travertine deposited by the hot waters" (page 533)



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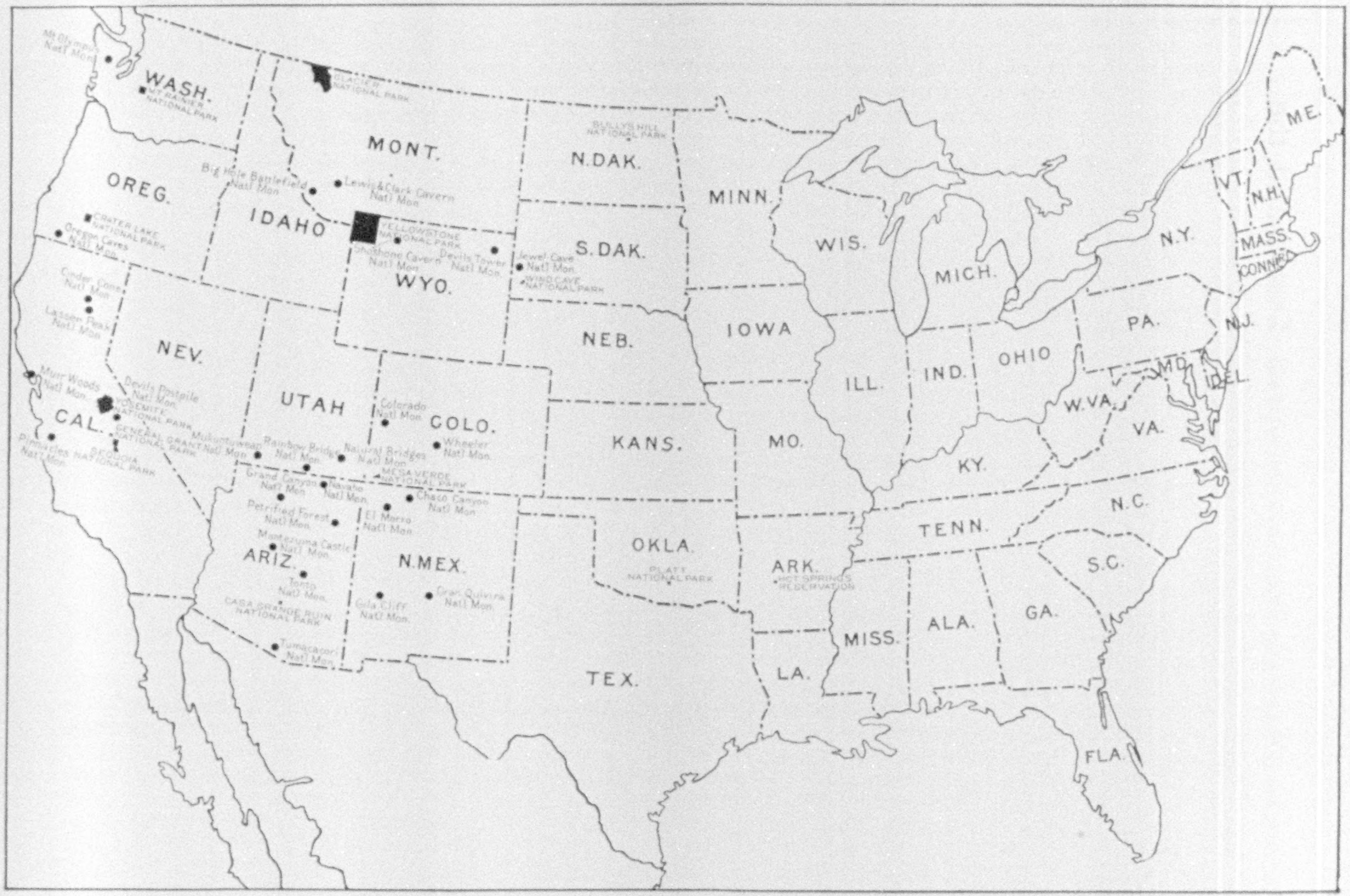
PULPIT TERRACE: MAMMOTH HOT SPRINGS, YELLOWSTONE PARK

"From below the glimmering terraces present the appearance of a mass of ice and snow. In places the slope is steep, as if a large portion of it had been torn away; at other points the descent is broken by a series of terraces of varying height, the front of each terrace being delicately fluted or molded into the most exquisite tracery" (page 533).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MAP SHOWING LOCATION OF NATIONAL MONUMENTS AND NATIONAL PARKS

Photo by W. S. Berry

MOUNTAIN SHEEP IN YELLOWSTONE NATIONAL PARK

I was watching both performances going on below me—upside down you understand—and the colors were real. The canyon was burning like Troy town; but it would burn forever, and, thank goodness, neither pen nor brush could ever portray its splendors adequately."

The tourist can see the great wonders of the Yellowstone in five and a half days. Twice that time is none too little for an adequate appreciation of the beauties of this wonderful region, because off the regular route are many charming bits of scenery that would be considered remarkable in a region not possessing so many other wonderful sights.

THE GLACIER NATIONAL PARK

Two hundred and sixty miles northwest of Yellowstone Park as the crow flies and 447 miles by the railroad is the newest of the nation's pleasure grounds, the Glacier National Park, created by the act of May 11, 1910. This park, which has an area of 915,000 acres, derives its name from the many glaciers which glisten in dazzling white far up on the steep slopes of the mountain. A fine road has been built from Belton, on the Great Northern Railway, to the foot of Lake McDonald, a distance of two miles. Beyond Lake McDonald the unbroken wilderness stretches to the Canadian border and beyond.

The trail winds through the solemn forests, redolent of pine and fir, along the shores of the clearest of lakes, by rollicking cascades and along the edge of precipices. Here are peaks whose sides have never been scaled and lakes whose shores have never been trod by human foot. From the summit of the continental divide one may see the lakes far below encompassed by precipice and forest, but no trail leads through the tangled woods, where the dense growth and the windfalls of countless storms conspire to keep the traveler from his goal.

In the entire area of this park there are at present only 199 miles of trail, but these enable the traveler to see some of the grandest of mountain scenery and get at least a glimpse of some of the 81 glaciers and 132 lakes that are shown on the government map.

From Lake McDonald one may make a number of trips, on horseback or on

Photo by Haynes

A PARK BEAR—"SILVER-TIP" GRIZZLY: YELLOWSTONE NATIONAL PARK

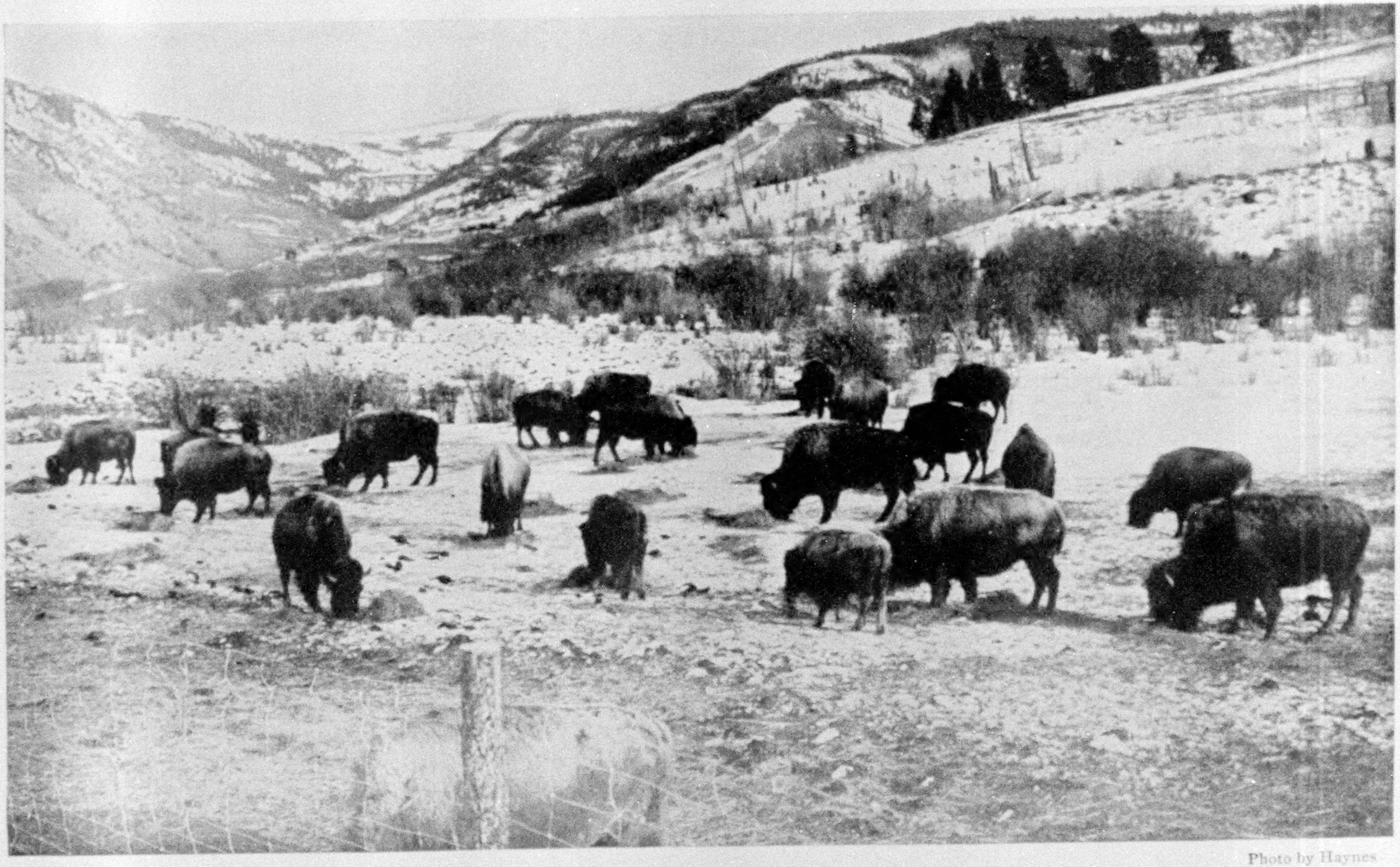

Photo by Haynes

PARK BUFFALO: YELLOWSTONE NATIONAL PARK

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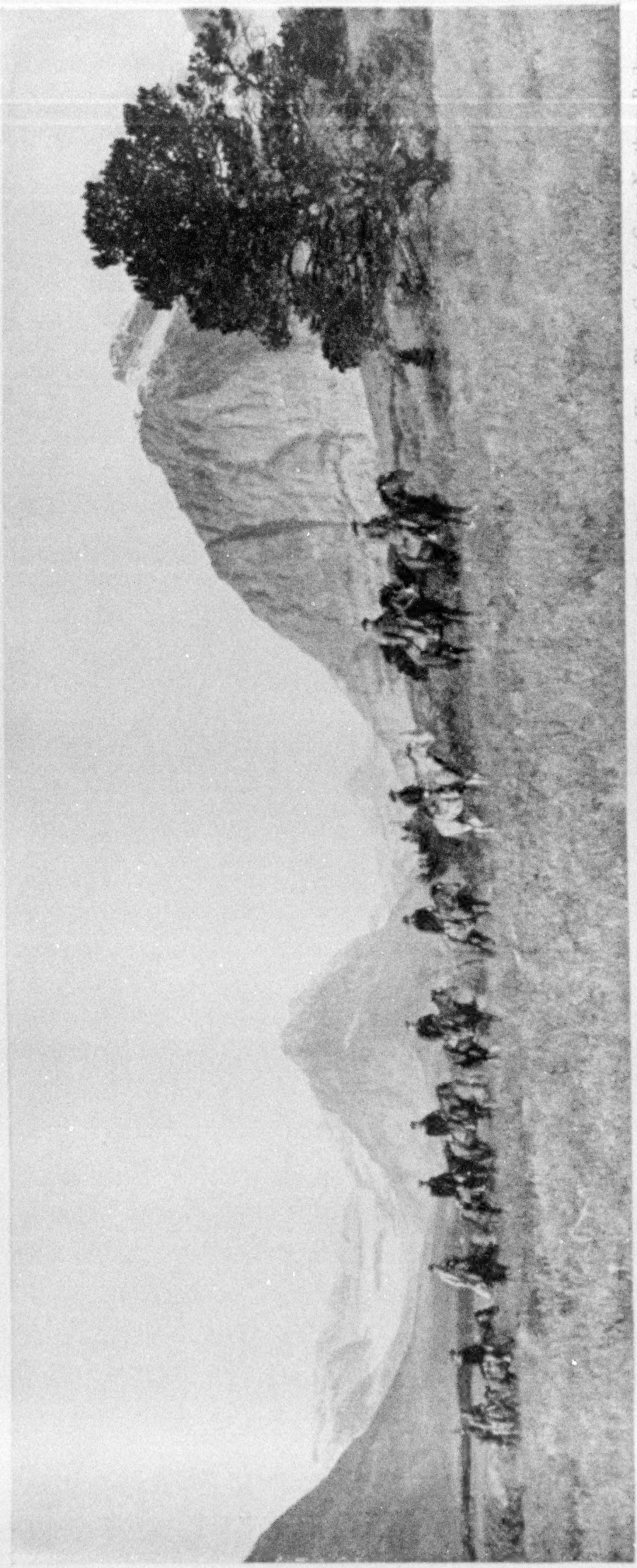

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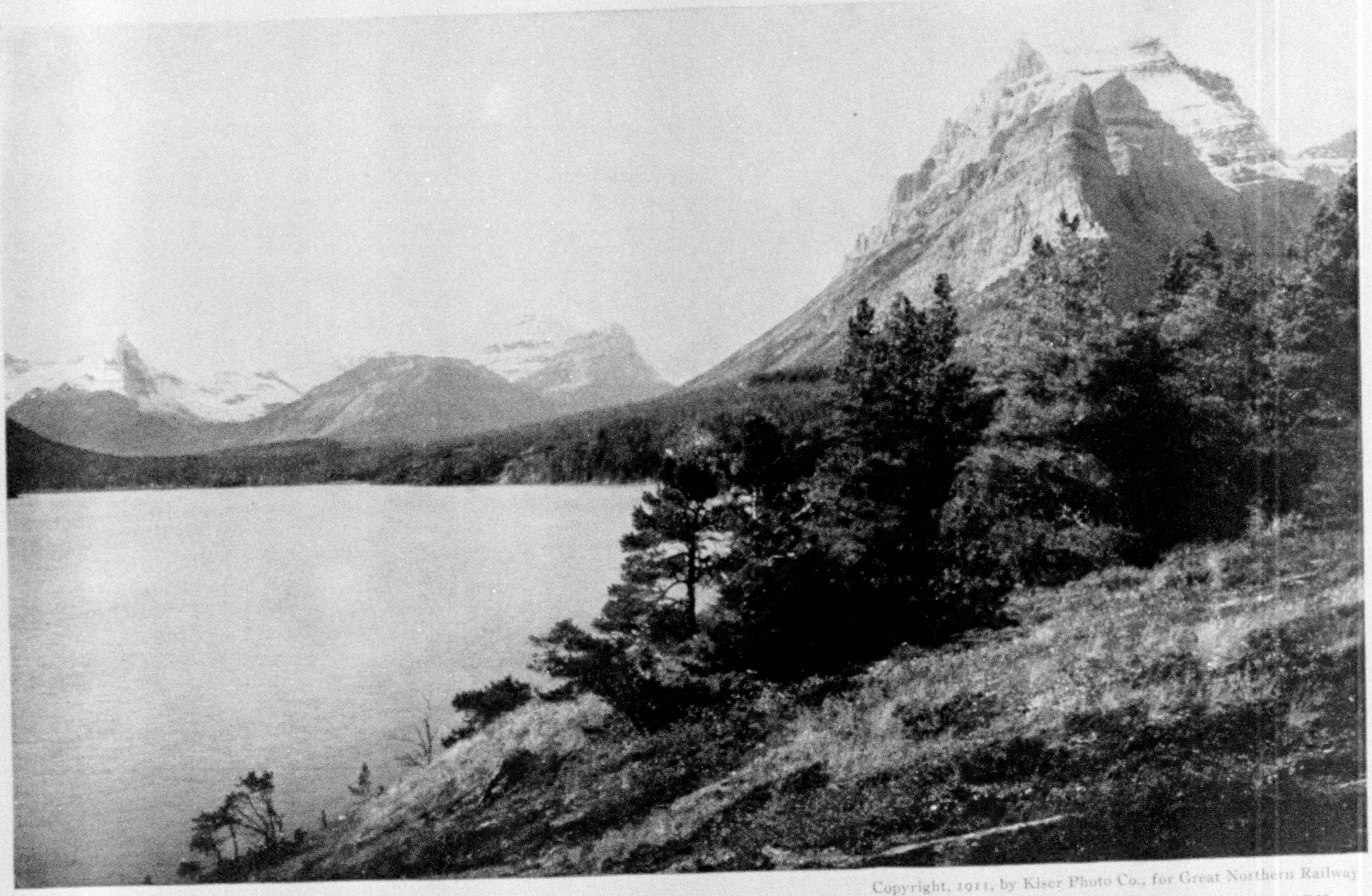
SCENE IN THE GLACIER NATIONAL PARK

foot, in a day. One of these is to Avalanche Lake, a charming body of water, which is surrounded by great cliffs and into which the melting snow pours cascades, looking in the distance like threads of silver. Another interesting trip, affording fine views of lake, mountain, and forest, is to the west of Lake McDonald, to Trout Lake, situated in one of the most impressive of glacial cirques. Still another trip is over the steep slope of Edwards Mountain to Sperry Glacier, where a camp has been established for the accommodation of the traveler. One may continue from Sperry Glacier over Gunsight Pass, amidst the finest of mountain scenery, to Upper St. Marys Lake, and thence to Midvale on the railroad.

THE CRATER LAKE

On the summit of the Cascade Range, in southern Oregon, lies the Crater Lake National Park, established by the act approved May 22, 1902. In the center of this park, which has an area of 159,300 acres, lies Crater Lake, unsurpassed in the gorgeousness and grandeur of its scenery, unrivaled in its location on the summit of a mountain 7,000 feet above sea-level, and unparalleled in its geologic history.

The traveler who stands on the rocky rim of the lake and looks across its limpid waters is at a point where once the molten lava boiled



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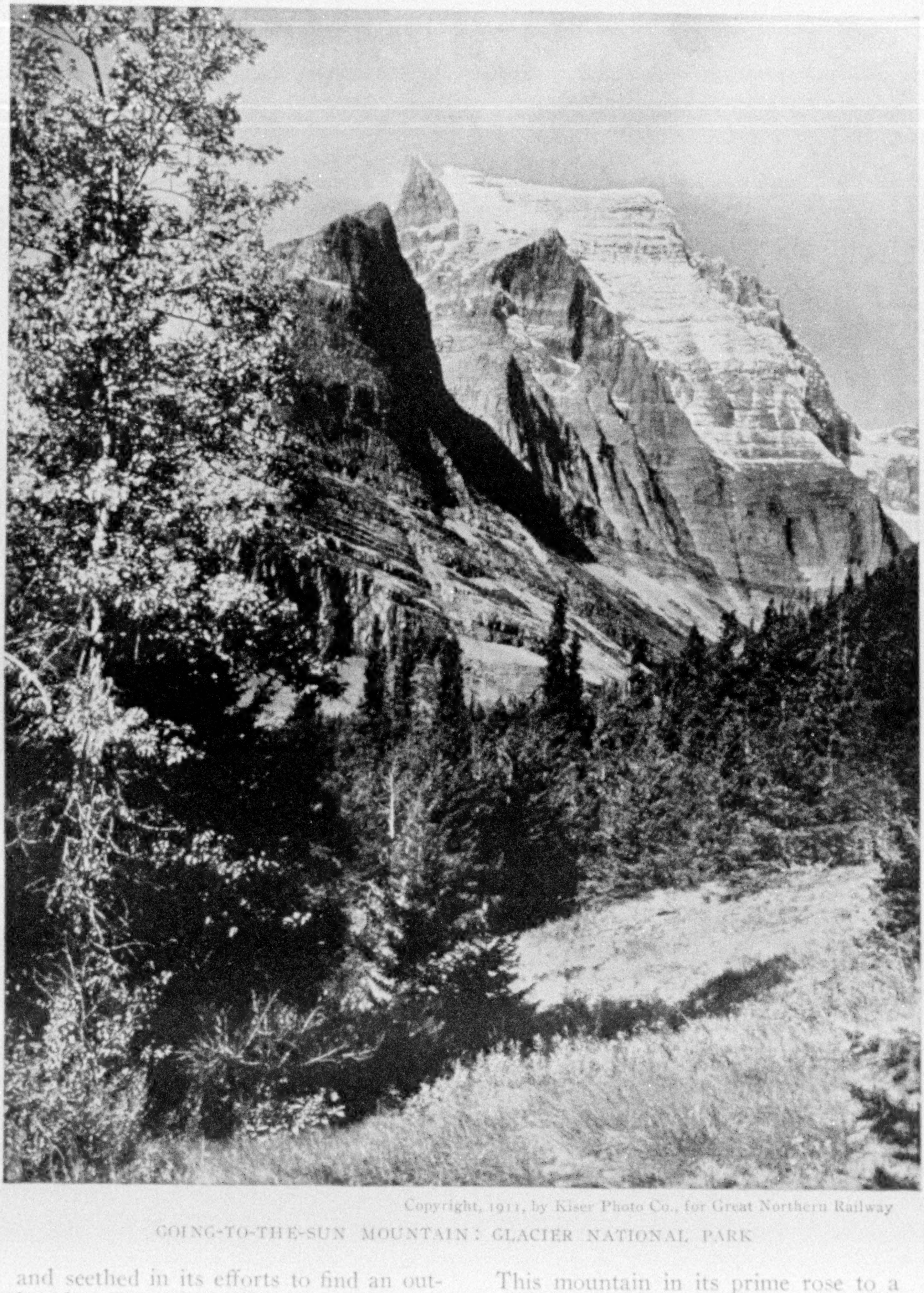
HEAD OF LAKE ST. MARY: GOING-TO-THE-SUN MOUNTAIN TO RIGHT FROM UPPER NARROWS: GLACIER NATIONAL PARK



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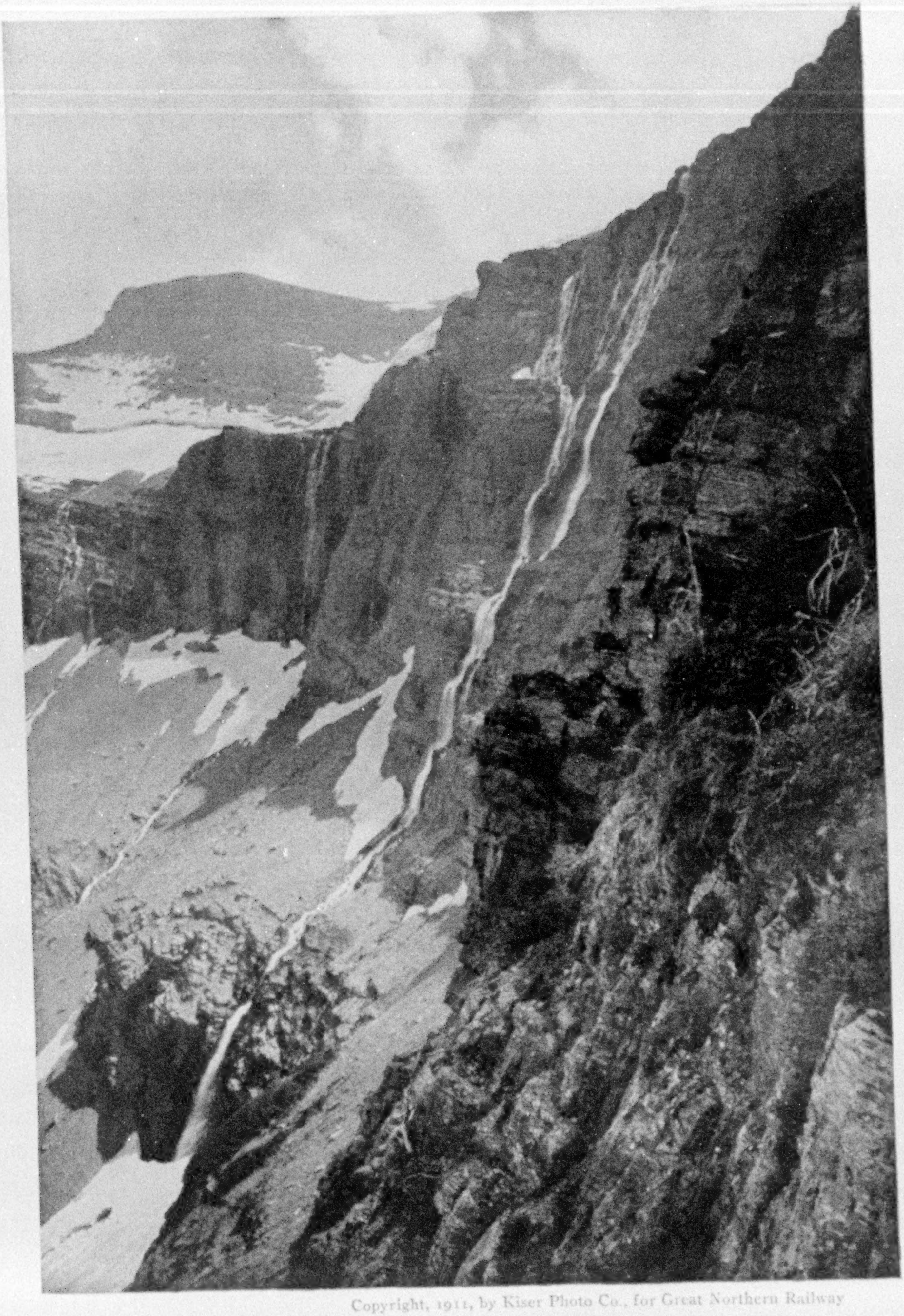
GOING-TO-THE-SUN MOUNTAIN: GLACIER NATIONAL PARK

and seethed in its efforts to find an outlet, for Crater Lake is all that remains of a great volcano that ages ago reared its lofty summit high above the crest of the Cascade Range.

This mountain in its prime rose to a height of over 14,000 feet above the sea. Mount Scott, which towers above Crater Lake on the east, was only a minor cone on its slope. The portion of the moun-



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LOOKING SOUTH ALONG THE EAST SIDE OF THE GARDEN WALL, SHOWING A 2,000-FOOT WATERFALL: GLACIER NATIONAL PARK

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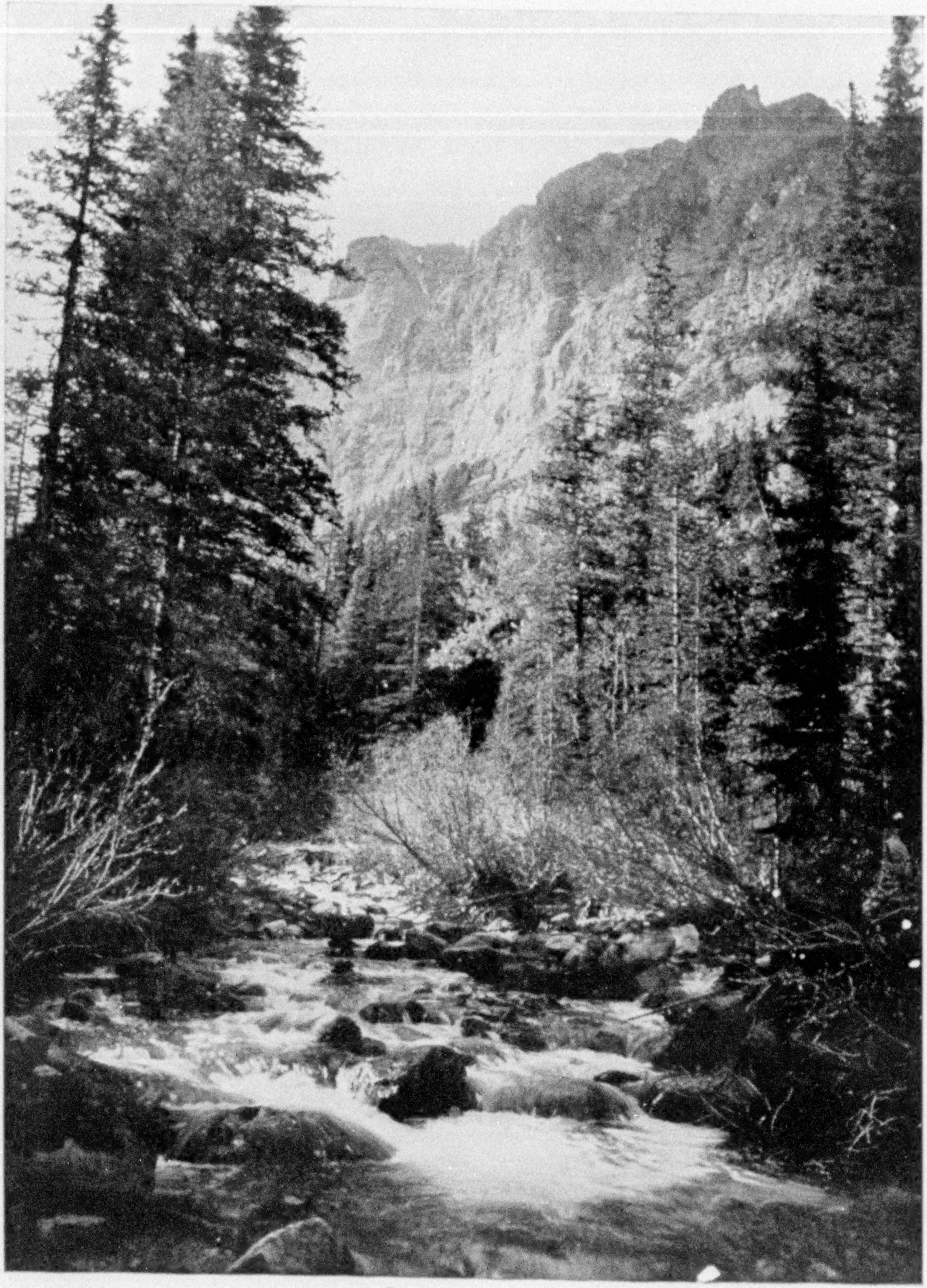

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CANYON CREEK: GLACIER NATIONAL PARK

"In the entire area of this park there are at present only 199 miles of trail, but these enable the traveler to see some of the grandest mountain scenery and get at least a glimpse of some of the 81 glaciers and 132 lakes that are shown on the government map" (page 539).

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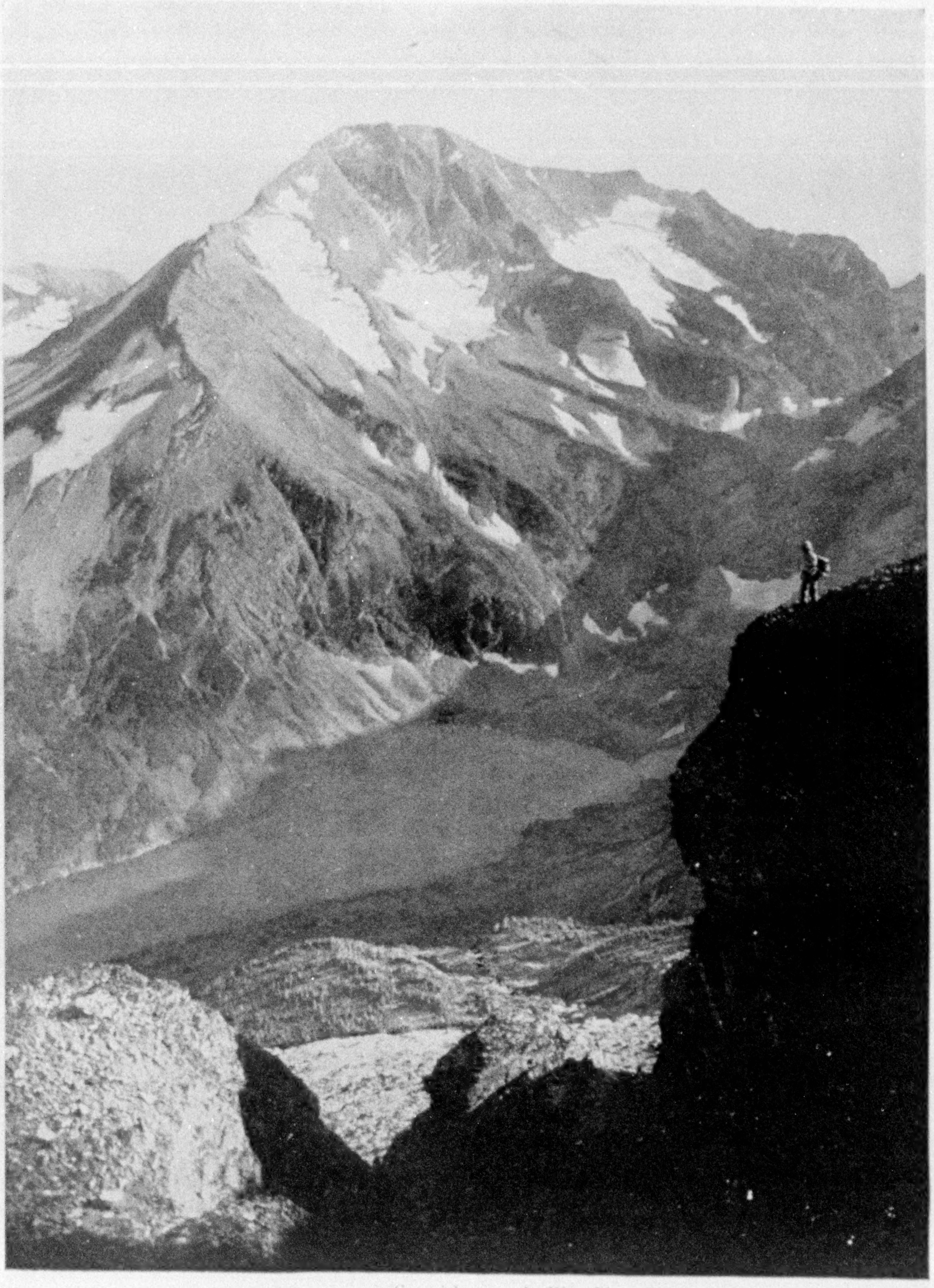

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GUNSIGHT LAKE FROM JACKSON MOUNTAIN: GLACIER NATIONAL PARK

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CLIMBING THE BLACKFOOT GLACIER: GLACIER NATIONAL PARK

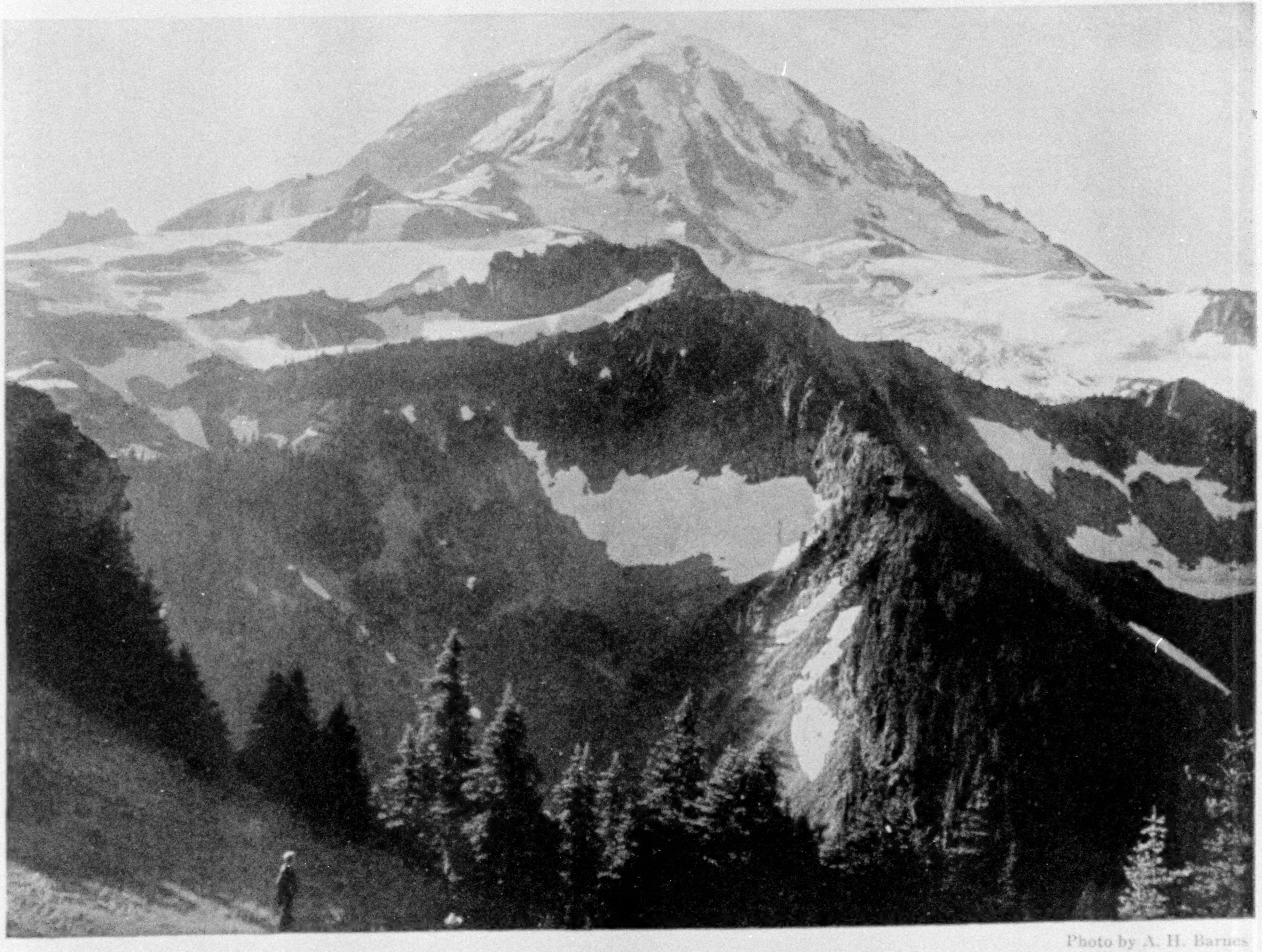

Photo by A. H. Barnes

NORTH SIDE OF RAINIER AS VIEWED FROM SPRAY PARK: ELEVATION, 6,000 FEET ABOVE SEA-LEVEL

See elsewhere in this number for article and photos of Mount Rainier by A. H. Barnes tain that has been destroyed was equal in size to Mount Washington, in New Hampshire, and had a volume of 17 cubic miles.

From the crest of the rim surrounding the lake the traveler beholds 20 miles of unbroken cliffs, which range from 500 to nearly 2,000 feet in height. The clear waters of the lake reflect the vivid colors of the surrounding walls, and whether in the soft glow of early morning, in the glare of the noonday sun, or in the rosy hues of the dying day, the view is one of awe-inspiring grandeur and beauty. Near the western edge of the lake is Wizard Island, in the top of which is an extinct crater 100 feet deep and 500 feet in diameter.

Near the southern shore is a jagged rock 200 feet high, known as Phantom Ship. Viewed from a distance it resembles a great vessel, but it apparently disappears when the shadow strikes it—hence its name.

This lake is not the only attraction of the national park in which it is situated. The surrounding peaks afford opportunities for climbing, and the extended views from their summits offer an adequate recompense for the effort necessary to reach them.

THE MOUNT RAINIER NATIONAL PARK

The largest glacial system in North America radiating from a single peak is situated on Mount Rainier, in western Washington. The Mount Rainier National Park, which was established by the act of March 2, 1899, and has an area of 207,360 acres, includes the mass of this great mountain and all the approaches to it.

Of Mount Rainier that sage of the forest and the mountains, John Muir, says: "If in the making of the West Nature had what we call parks in mind—places for rest, inspiration, and prayers—this Rainier region must surely be one of them. In the center of it there is a lonely mountain capped with ice; from the ice-cap glaciers radiate in every direction, and young rivers from the glaciers; while its flanks, sweeping down in beautiful curves, are clad with forests and gardens and filled with birds and animals. Specimens of the best of Nature's treasures have been lovingly gathered here and arranged in simple symmetrical beauty within regular bounds."

From Puget Sound, 60 miles away, one gets superb views of this great mountain rising over 14,000 feet above the level of the sea. Now its snowy summit looms up sharp and severe against the eastern sky; now it is veiled in mist, like some giant priestess keeping vigil over the valley and plain; now it is garbed in the softest of violet-pink as it is illumined by the after-glow of the setting sun.

The traveler approaching Mount Rainier passes through areas in which the climate and the vegetation range from temperate to arctic. The lower valley is thickly mantled with fir, hemlock, and cedar, the undergrowth is dense, and the forest floor is covered with moss and a litter of fallen branches and decayed wood.

As the mountain is ascended the vegetation changes; at an altitude of 4,000 feet the forest cover consists of mountain hemlock, Alpine fir, and Alaska cedar.

Here in the very shadow of the snow-capped mass the valleys are literally carpeted with avalanche lilies, asters, anemones, rhododendrons, and other bright flowers (see pages 591 to 613).

As one goes higher the trees become smaller. They are gnarled and twisted, as if they had endeavored to escape the fury of the fierce blasts that sweep over the upper slopes. The trees dwindle to straggling bushes, and then the climber is on the bare rocks, polished and scarred by the masses of snow and ice that have swept over them. The last four miles to the summit is along the ridges between the glaciers or over the ice. The way is rough and steep, and is a dangerous one unless accompanied by a guide.

THE YOSEMITE

California boasts of three national parks—the Yosemite, the Sequoia, and the General Grant. As long ago as 1864 an act of Congress granted the Yosemite Valley and the Mariposa grove of big trees to the State of California for public

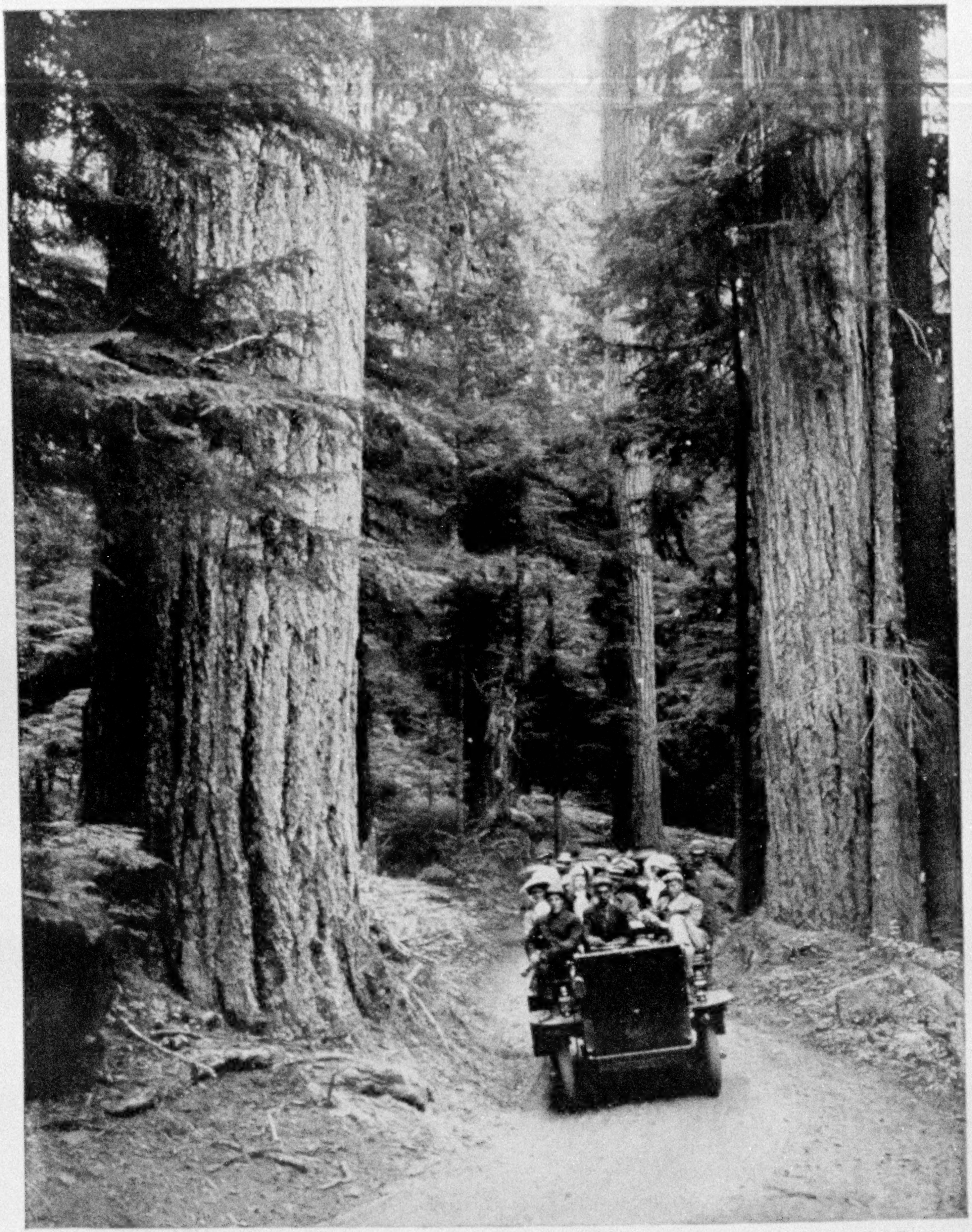

Photo by Asahel Curtis

FOREST OF FIR IN MOUNT RAINIER NATIONAL PARK

"In the center of it there is a lonely mountain capped with ice; from the ice-cap glaciers radiate in every direction, and young rivers from the glaciers; while its flanks, sweeping down in beautiful curves, are clad with forests and gardens and filled with birds and animals. Specimens of the best of nature's treasures have been lovingly gathered here and arranged in simple symmetrical beauty within regular bounds."—JOHN MUIR. See page 550.

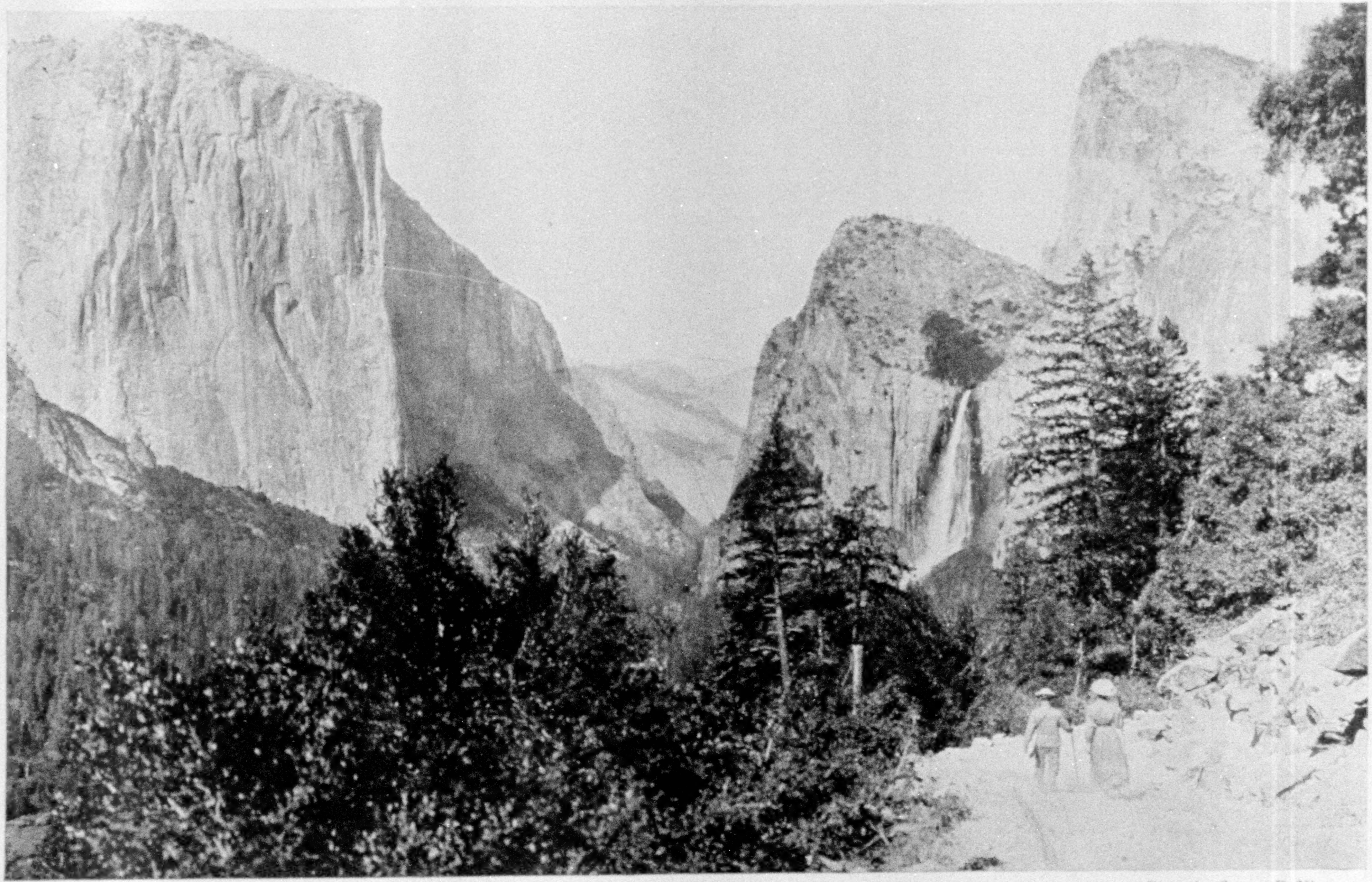

Photo by George R. King

ON WAWONA ROAD, IN THE YOSEMITE NATIONAL PARK: EL CAPITAN ON LEFT

"The Yosemite Valley is about seven miles long and three-fourths of a mile wide. In the center of this valley is a level, parklike meadow, through which runs Merced River, while on either side the mountains rise steep and precipitous to a height of 4,000 feet above the floor of the valley" (page 556).

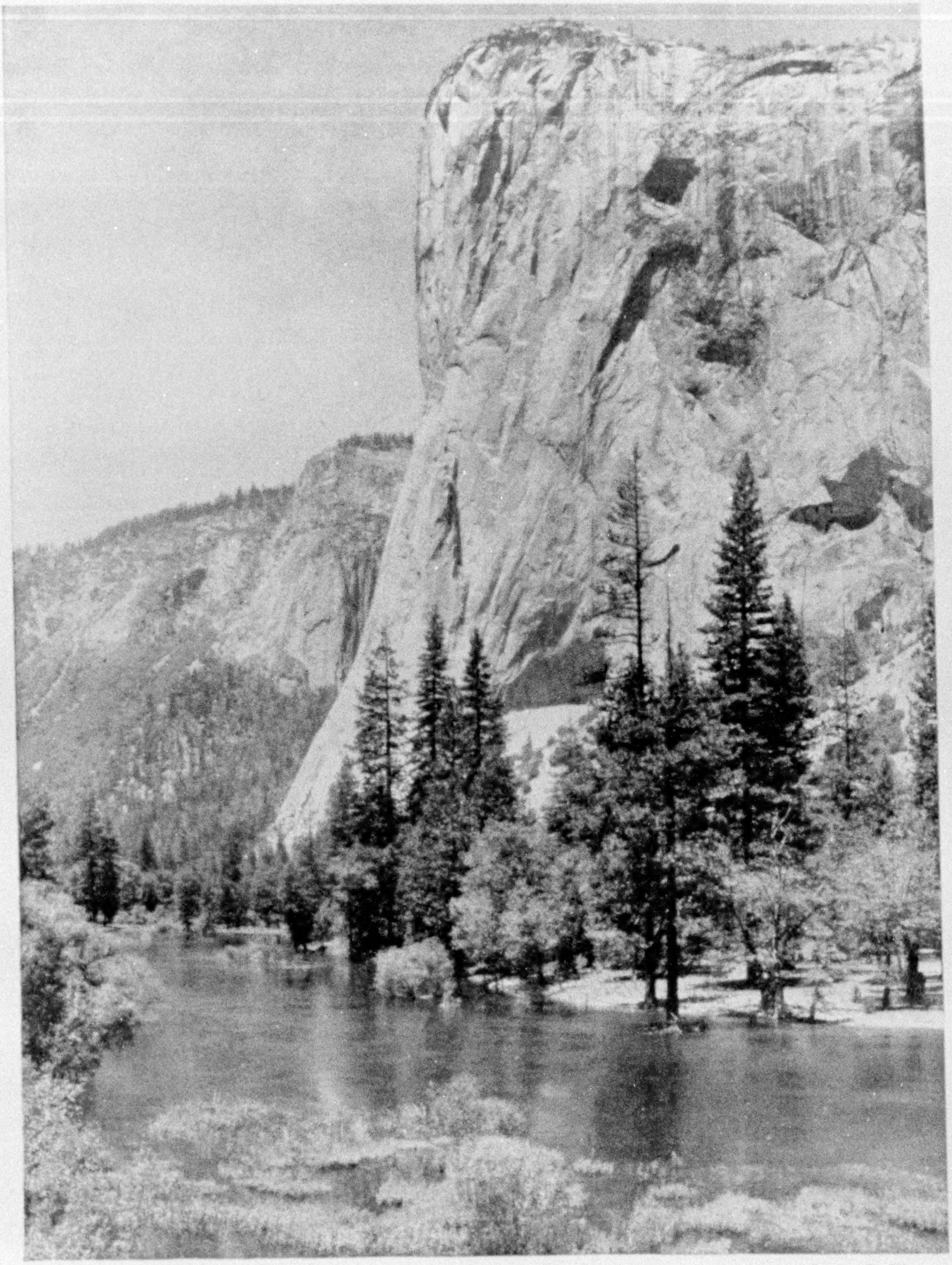

Photo by George R. King

THE WHITE GRANITE FACE OF EL CAPITAN: YOSEMITE NATIONAL PARK

"From the cliffs surrounding the valley the scene is one of remarkable inspiration and beauty. At the foot of the traveler lies the valley floor, the green trees and meadows and the winding river giving the effect of a rich velvet carpet, over which a line of silver has been drawn; here and there one gets glimpses of the foaming white waters, hurling themselves to the valley below; on both sides of the valley rise the great walls of rock, sculptured by the elements into various fantastic shapes and figures" (page 557).

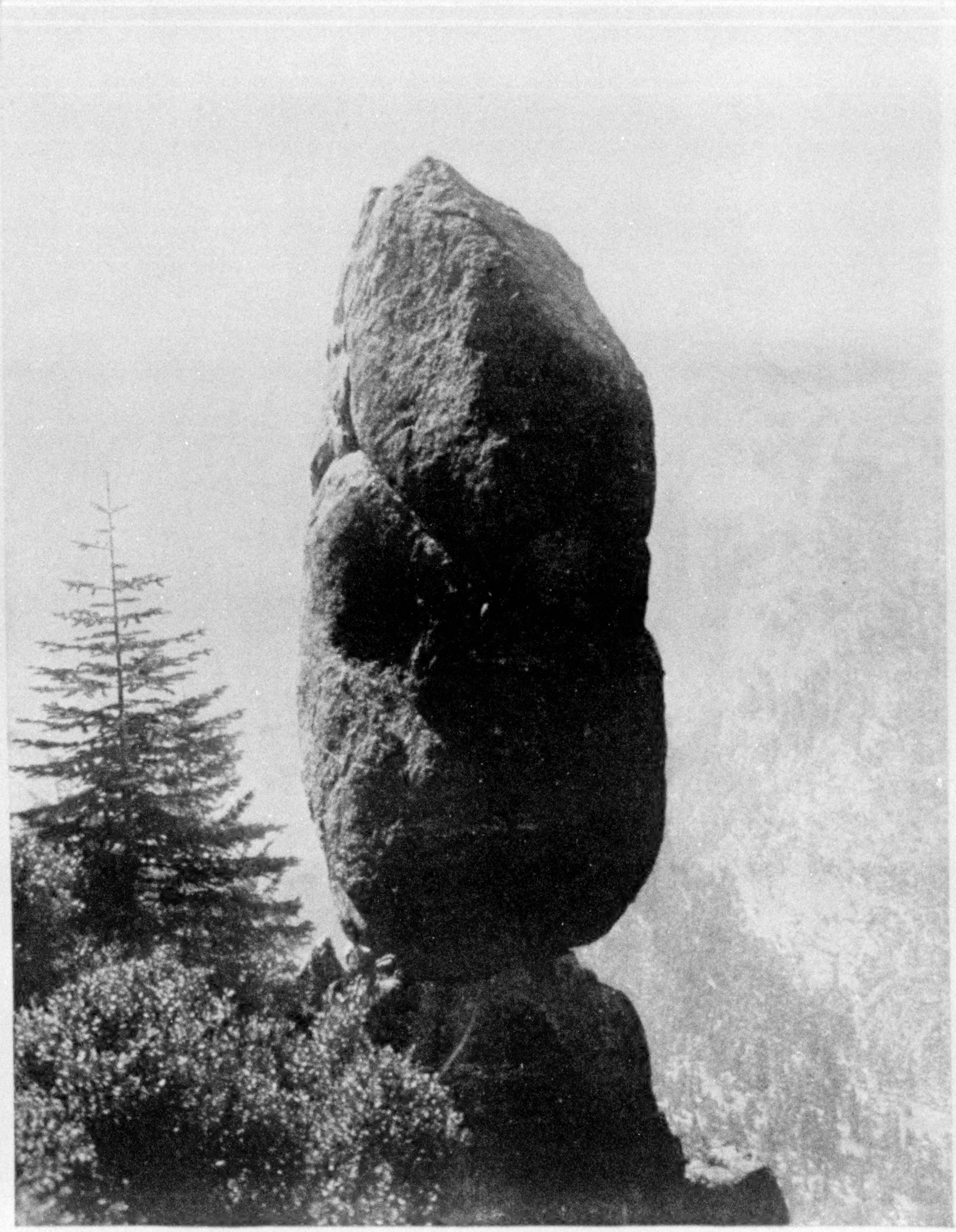

Photo by George R. King

AGASSIZ COLUMN: YOSEMITE NATIONAL PARK

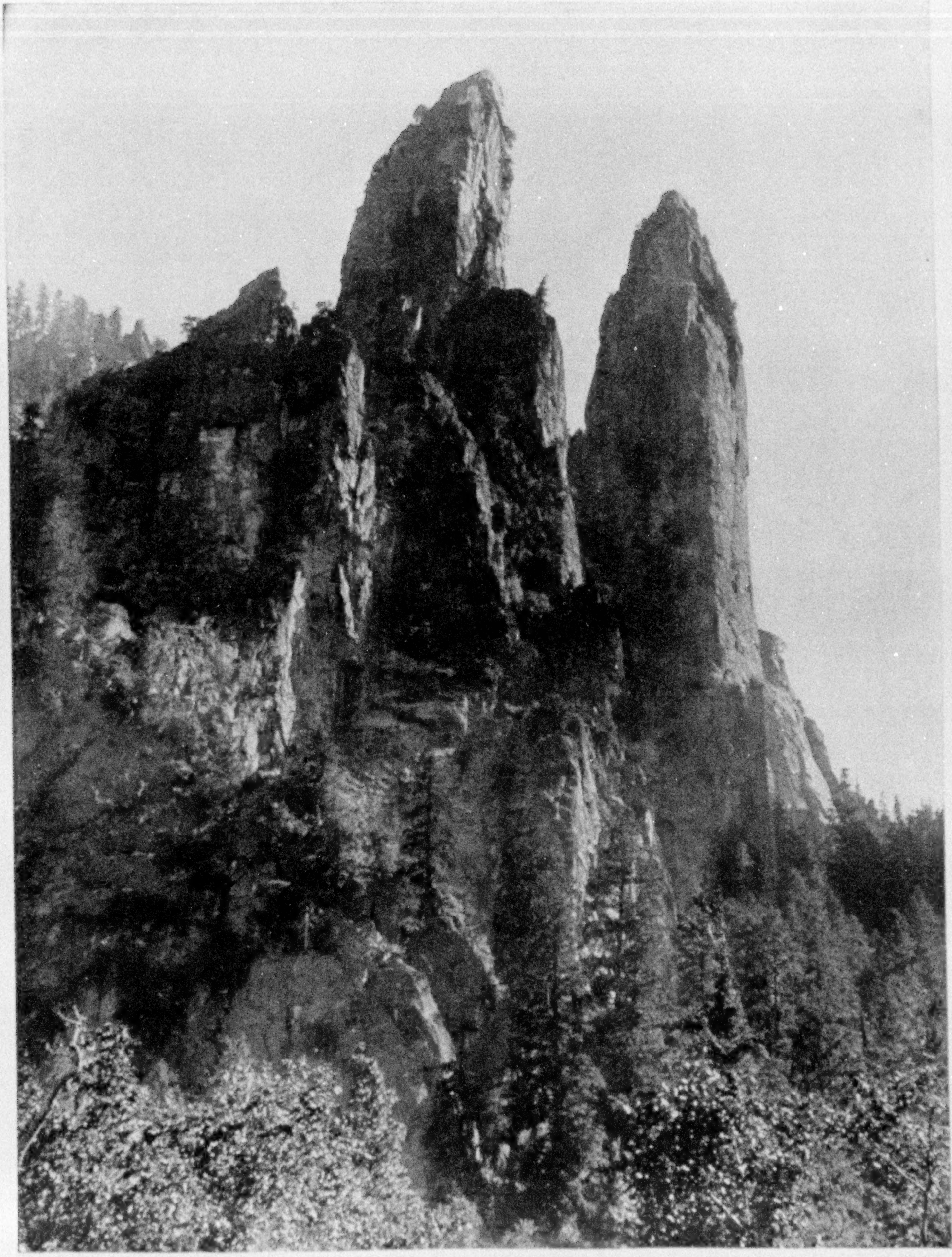

Photo by George R. King

CATHEDRAL SPIRES: YOSEMITE NATIONAL PARK

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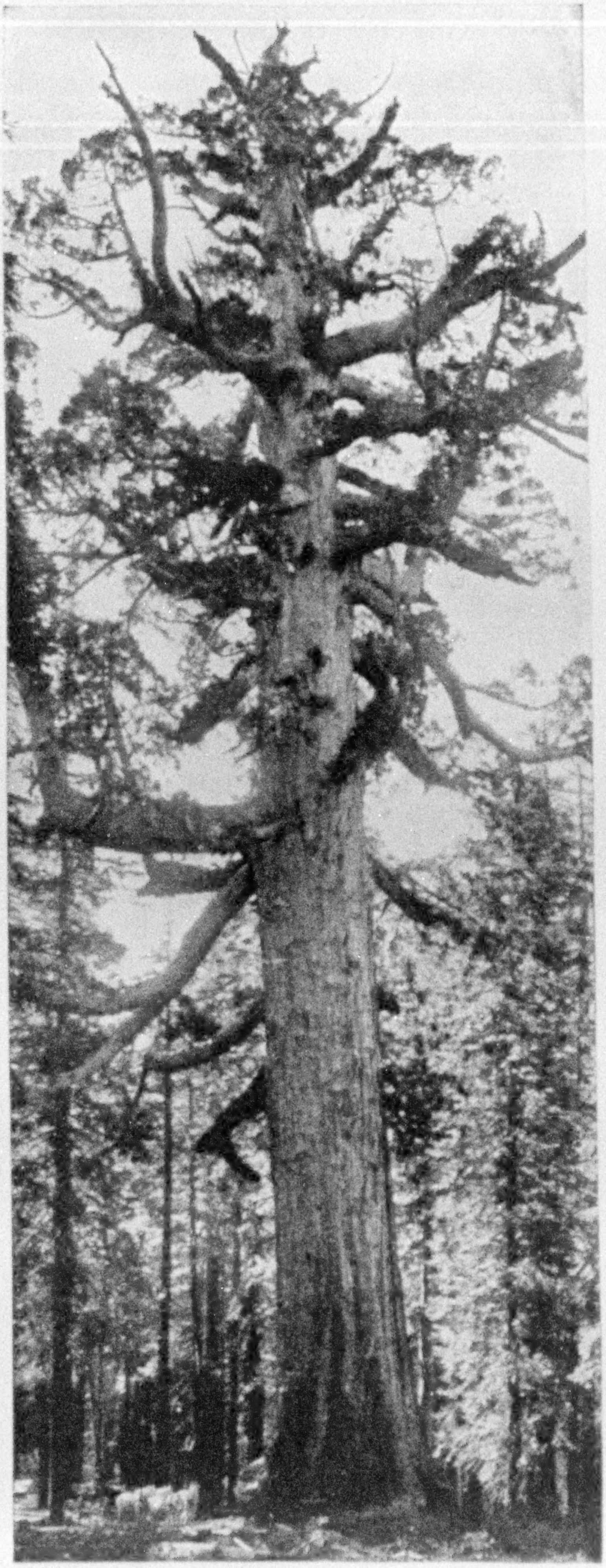

Photo by J. T. Boysen

GRIZZLY GIANT MARIPOSA; BIG TREE GROVE, YOSEMITE NATIONAL PARK

Note the buckboard and team of horses

use and recreation. By the act of October 1, 1890, the portion of Yosemite Park outside of the Yosemite Valley and the Mariposa big-tree grove was set apart as a public reservation, the boundaries being changed by the act of February 7, 1905. The Legislature of California, by the act approved March 3, 1905, receded the Yosemite Valley and the Mariposa big-tree grove to the United States, and the joint resolution of Congress approved June 11, 1906, accepted the recession and fixed the boundaries of the park as they are at present, giving it an area of 719,622 acres.

The Yosemite Valley, which is the most frequently visited place, is about seven miles long and three-fourths of a mile wide. In the center of this valley is a level, parklike meadow, through which runs Merced River, while on either side the mountains rise steep and precipitous to a height of 4,000 feet above the floor of the valley.

Numerous streams drop from the edge of the cliff to the valley below. The first of these as the tourist enters the valley is the Bridal Veil Falls. A stream fully 30 feet wide falls first a distance of 600 feet, then rushes over a sloping pile of débris, and then drops perpendicularly 300 feet more. From the points from which it is generally viewed it seems to make but one plunge, and the general effect is that of a fall 900 feet high.

The great waterfall in this park, however, is the Yosemite Falls. This is a stream 35 feet wide, and in the spring and early summer, when the snow is melting upon the high Sierra, its roar can be heard all over the valley and the shock of the descent rattles the windows a mile away. This fall is conceded by all critics to be one of the most wonderful and beautiful cascades in the world. Its first fall is 1,430 feet sheer drop; then comes a series of cascades, partly

XUM

hidden, in which the fall is 675 feet, and finally a vertical drop of 320 feet.

From the cliffs surrounding the valley the scene is one of remarkable inspiration and beauty. At the foot of the traveler lies the valley floor, the green trees and meadows and the winding river giving the effect of a rich velvet carpet, over which a line of silver has been drawn; here and there one gets glimpses of the foaming white waters, hurling themselves to the valley below; on both sides of the valley rise the great walls of rock, sculptured by the elements into various fantastic shapes and figures. Beyond the valley is a wonderful region of mountain and forest, accessible only by pack train.

THE LARGEST TREES IN THE WORLD

The largest trees in the world are found in the Yosemite, the General Grant, and the Sequoia National parks. The Sequoia National Park, established by the act of September 25, 1890, is located in Tulare County and has an area of 161,597 acres. The General Grant Park, established by the act of October 1, 1890, is in Tulare and Fresno counties and has an area of 2,536 acres.

These trees grow to a height of over 300 feet and have a circumference of over 100 feet at the base, the bark sometimes exceeding 40 inches in thickness. The rings in their trunks show that many of them are over 3,000 years old. For a hundred feet or more they are clear of branches, then great limbs the thickness of large trees extend

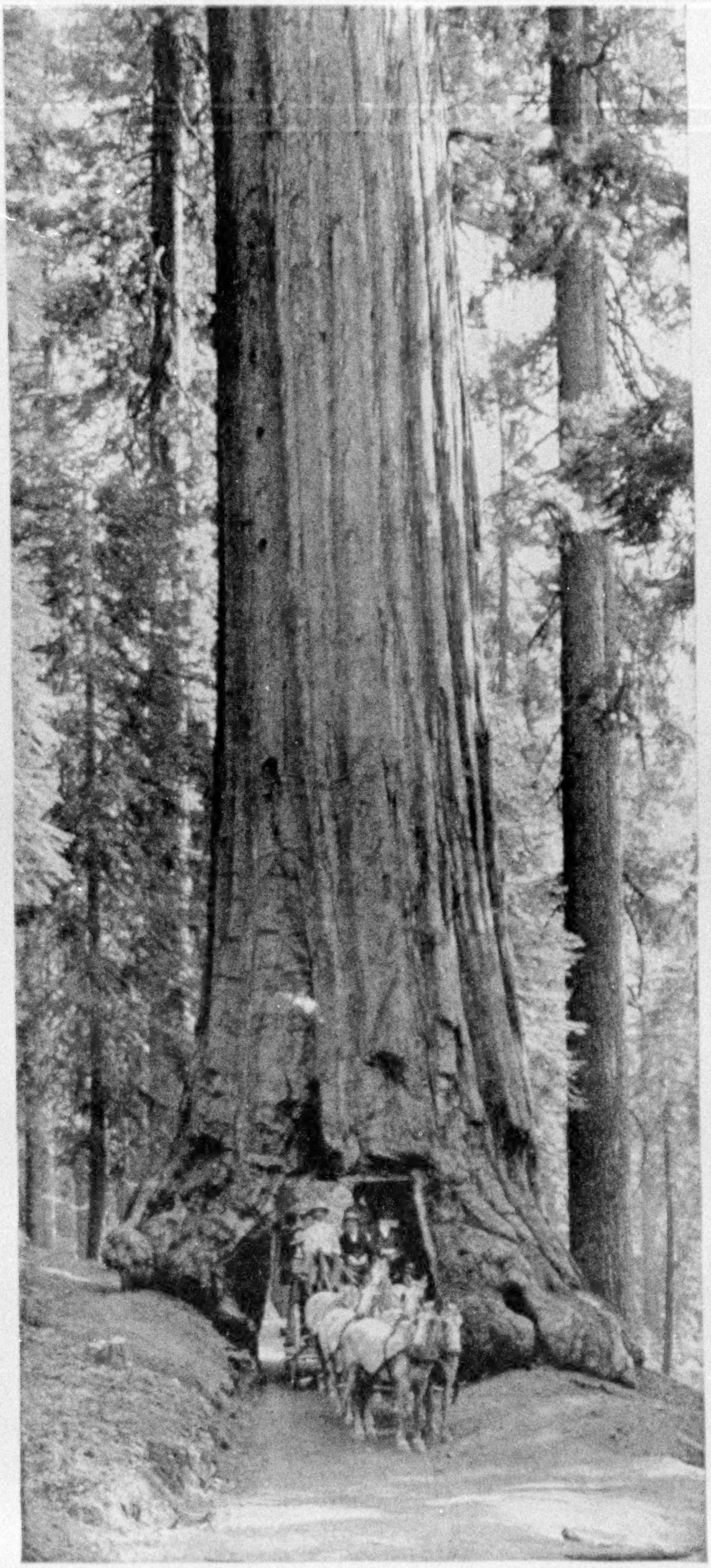

Photo by J. T. Boysen

WAWONA TREE; MARIPOSA BIG TREE GROVE, YOSEMITE NATIONAL PARK

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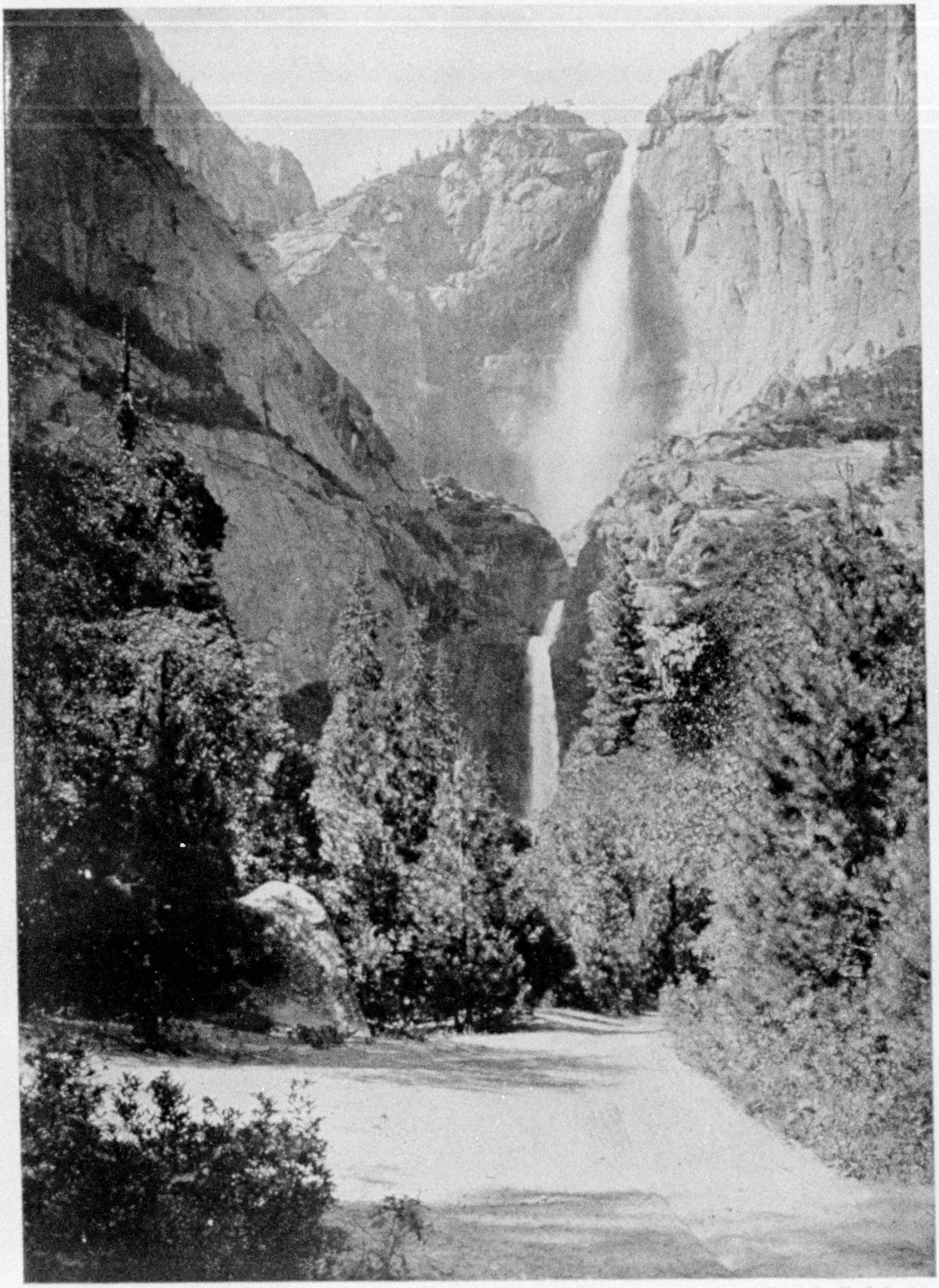

Photo by H. C. Best

YOSEMITE FALLS, IN THE YOSEMITE VALLEY: YOSEMITE NATIONAL PARK

"This is a stream 35 feet wide, and in the spring and early summer, when the snow is melting upon the high Sierra, its roar can be heard all over the valley and the shock of the descent rattles the windows a mile away. This fall is conceded by all critics to be one of the most wonderful and beautiful cascades in the world. Its first fall is 1,430 feet sheer drop; then comes a series of cascades, partly hidden, in which the fall is 675 feet, and finally a vertical drop of 320 feet" (page 556).

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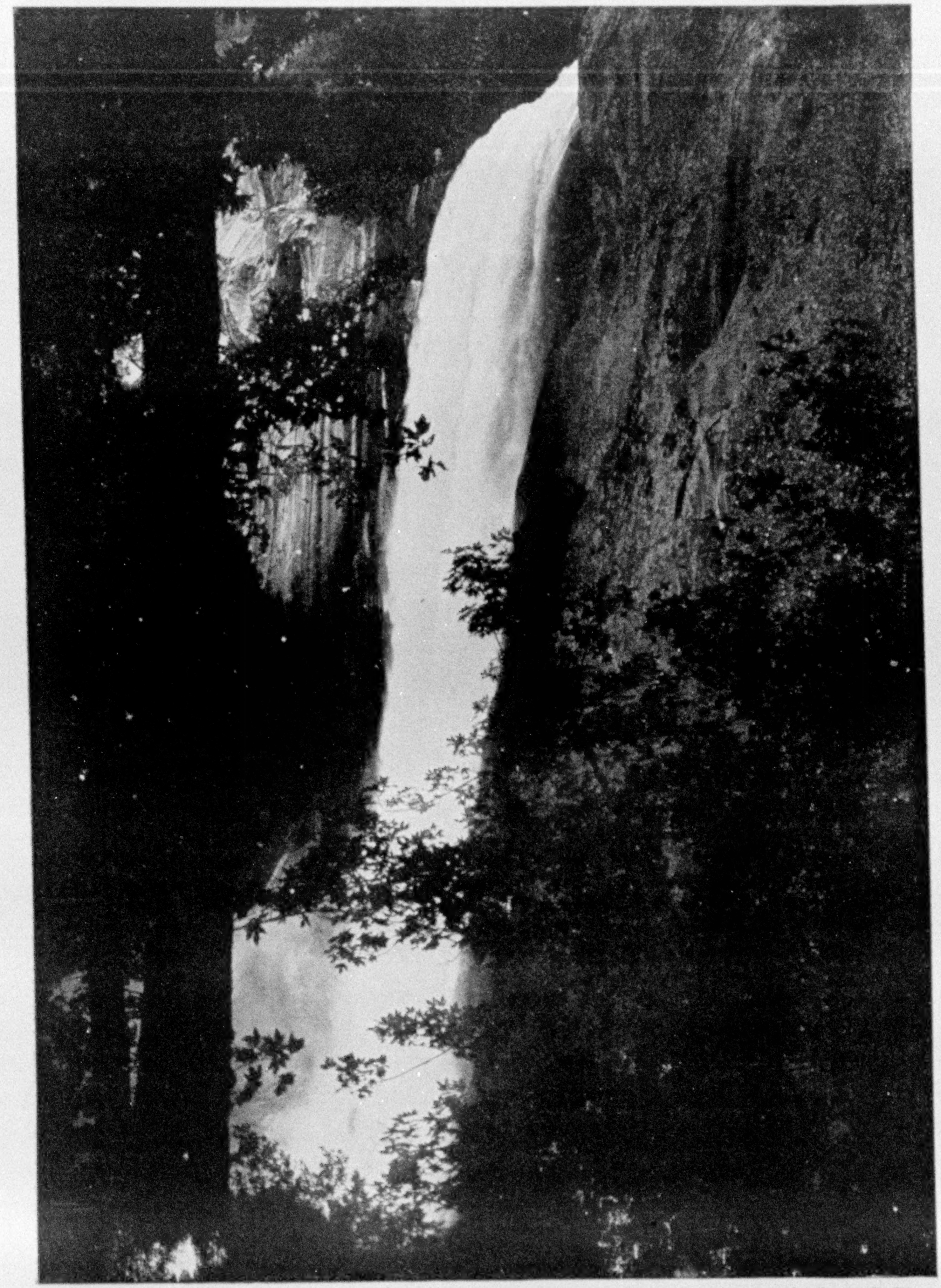

Photo by George R. King

VERNAL FALL FROM MIST TRAIL: YOSEMITE NATIONAL PARK

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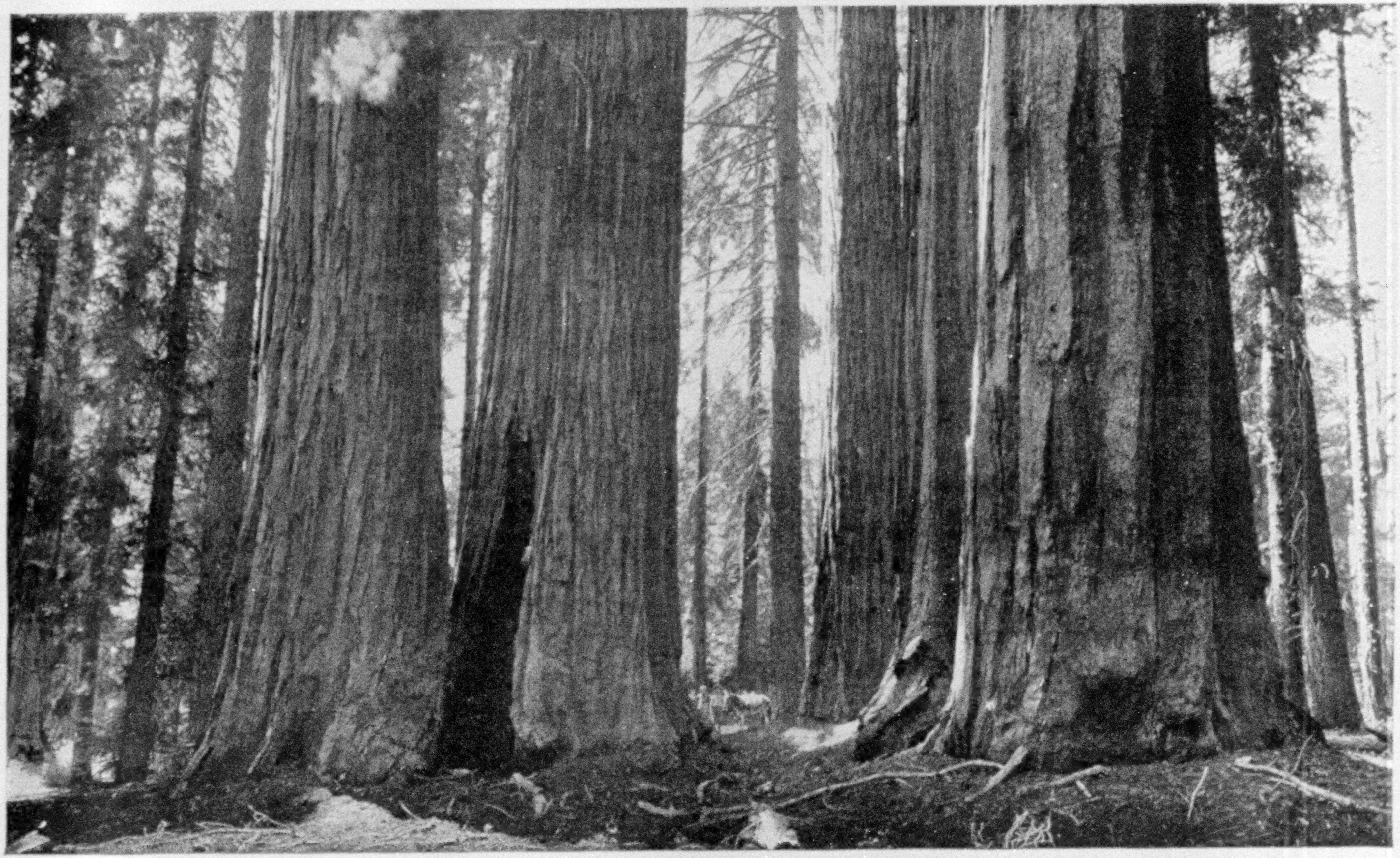

Photo by Southern Pacific R. R. Co.

THE PARKER GROUP, IN THE GIANT FOREST: SEQUOIA NATIONAL PARK: NOTE THE TWO MEN STANDING BESIDE THE HORSE

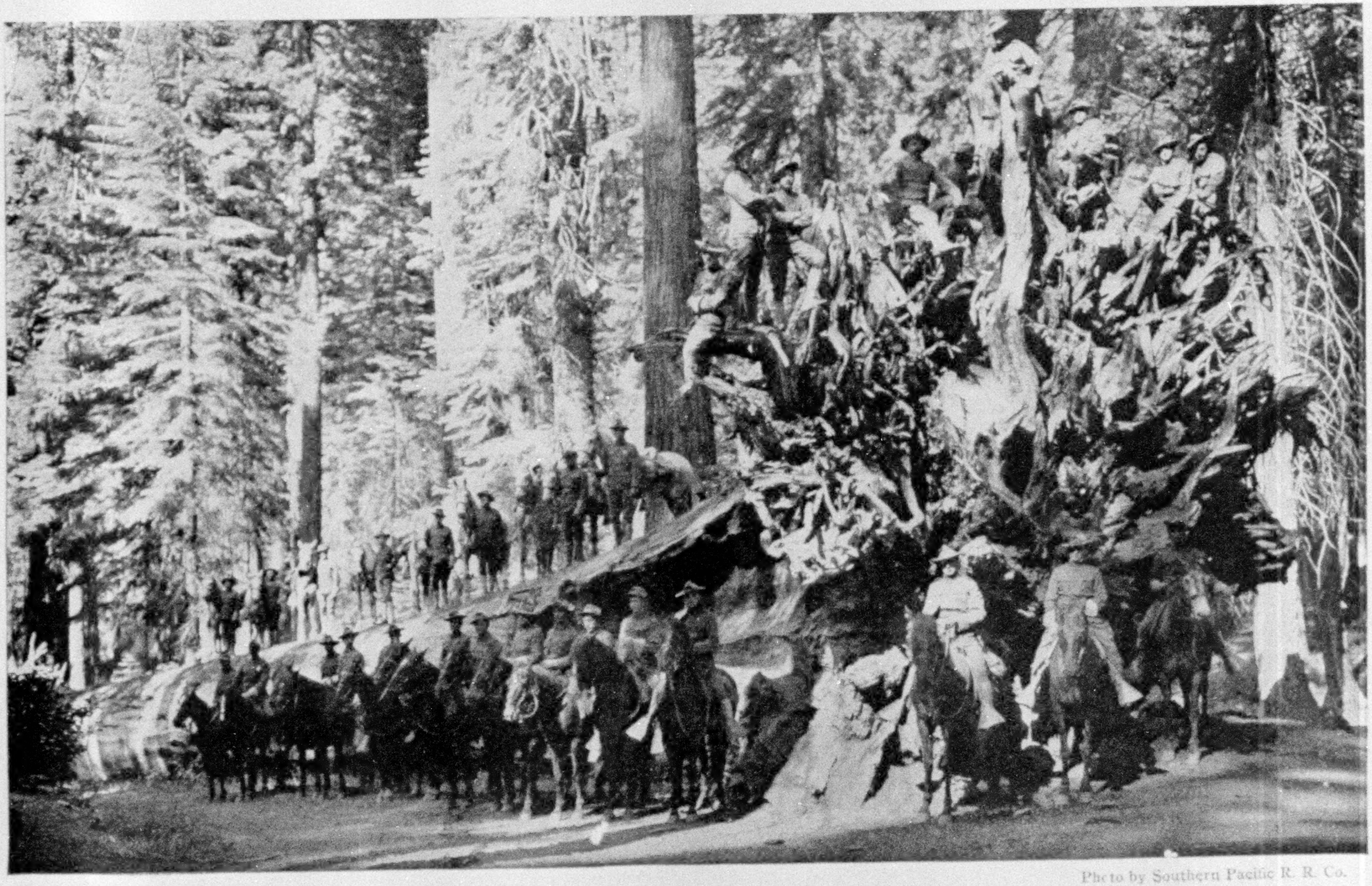

Photo by Southern Pacific R. R. Co.

A FALLEN MONARCH, IN THE MARIPOSA BIG TREE GROVE: YOSEMITE NATIONAL PARK

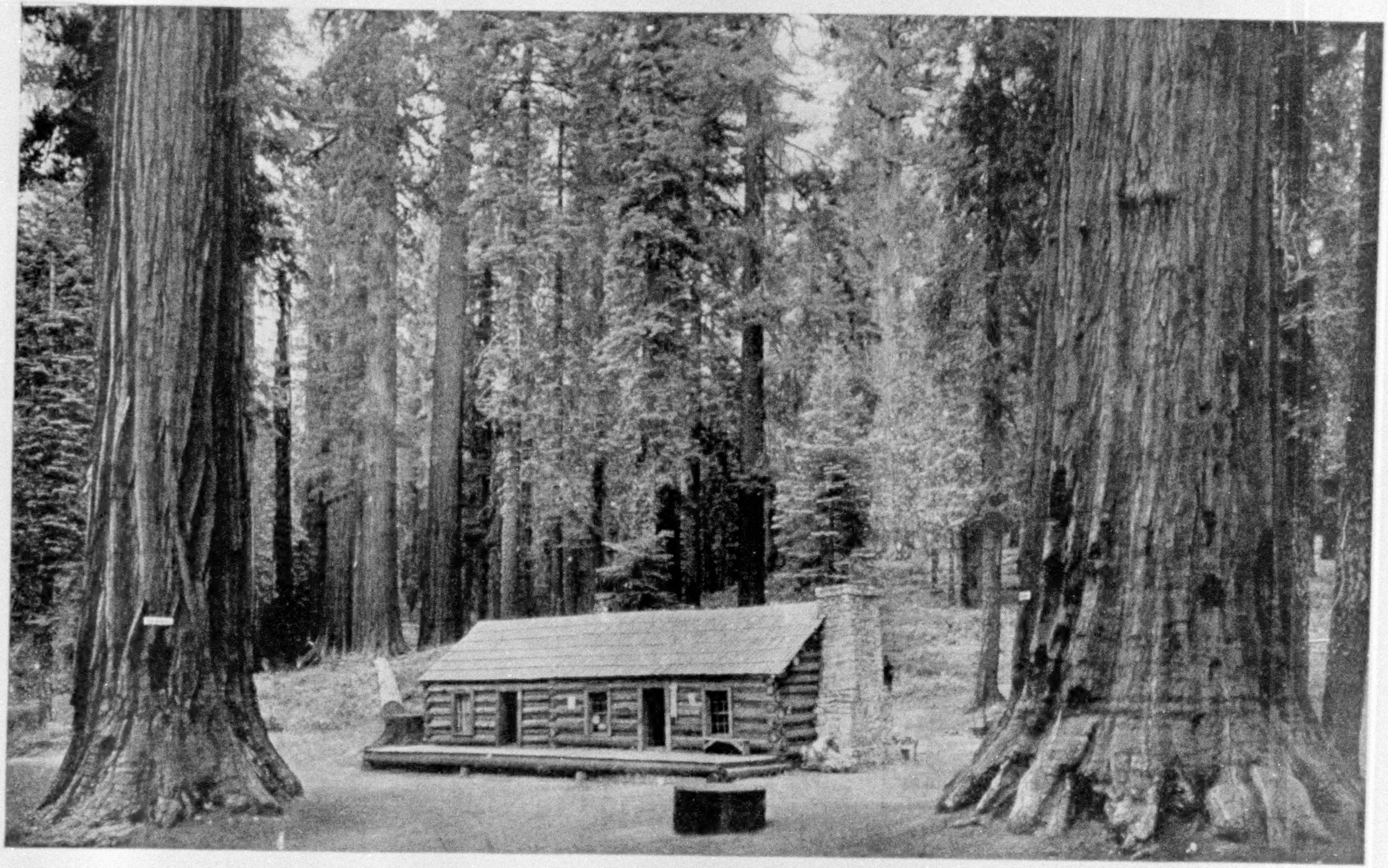

Photo by Southern Pacific R. R. Co.

IN THE MARIPOSA BIG TREE GROVE: YOSEMITE NATIONAL PARK, CALIFORNIA

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above the tops of the pines of the surrounding forest.

Their branches are not swayed nor are their trunks bent by the fiercest wind; they stand calm, silent, and majestic—hoary hermits of the forest—unmoved and unaffected by the puny actions of the youthful world surrounding them.

In the Yosemite Park the principal groves are the Tuolumne, the Merced, and Mariposa. In the last-named grove the road extends through the base of one of the trees, and a coach and four are regularly driven through this tunnel without danger or discomfort to the traveler.

In the General Grant Park there is only one grove, but it is in the Sequoia Park that these trees are found in the greatest number. There are 12 groves in this park that contain altogether about 12,000 sequoia greater than 10 feet in diameter. In the Giant Forest Grove there are 5,000 such trees, in the Muir Grove 3,000, and in the Garfield Grove 2,500.

A bill was introduced in the last Congress providing for enlarging Sequoia Park so that it would extend to the northern edge of the watershed of Kings River. In this area the general topography is similar to that in Yosemite. The streams cut deep gorges through the sierra, great masses of rock stand sentinel-like on the edges of the narrow valleys, and everywhere are forests of pine, fir, and cedar, and wild flowers, ferns, and mosses of superb beauty. The boundary proposed is a natural one, being the ridge line of numerous mountain chains.

Practically all the new territory that would be acquired is public land of little value commercially and of great value for park purposes. Its natural beauties are great and varied; it forms a natural game preserve, and within its borders are some of the finest trout streams in world.

THE MESA VERDE NATIONAL PARK

In southwestern Colorado the dwellings of the extinct race of cliff-dwellers are preserved in the Mesa Verde National Park, established by the act of June 29, 1906. In the 42,376 acres included in this park there are about 400 cliff-houses of varying size. The period at which these cliff dwellings were occupied and the cause of the depopulation are unknown, but there is no doubt that the buildings are prehistoric.

Unfortunately, much of the valuable and interesting pottery and other relics were carried off from these ruins before the park was established. Since the creation of the park three of the greatest of the ruins—Cliff Palace, Spruce Tree House, and Balcony House—have been repaired and the rubbish of centuries has been removed. The tottering walls have been braced and reinforced with steel and concrete, the underground chambers have been cleaned out and repaired, and drains have been built in order to carry off the storm waters and prevent further erosion.

The most impressive ruin in the park is Cliff Palace, a structure about 300 feet in length, built under the roof rock of an enormous cave. This ruin contains 146 living rooms, including numerous large chambers used for assembly rooms for the purpose of worship or council.

Spruce Tree House is the next largest ruin. The curved front wall of this structure measures 218 feet and the ruin is 89 feet deep. The ruin contains 114 secular rooms, eight subterranean kivas, and a roofless kiva, sometimes called a warrior's room.

Many of the dwelling chambers are three stories high, several filling the interval from the floor to the roof of the cave. It is estimated that the population of this ruin was 350 persons. Balcony House is a smaller ruin, containing about 25 rooms.

Little is known of the vanished race that dwelt in these inaccessible canyons. That they were small-sized is shown by the dwarf-like mummies that have been found in their dwellings. They evidently lived in communities for mutual protection, access to their dwellings being obtained by following narrow trails along the cliffs or by small tunnels cut through the rock.

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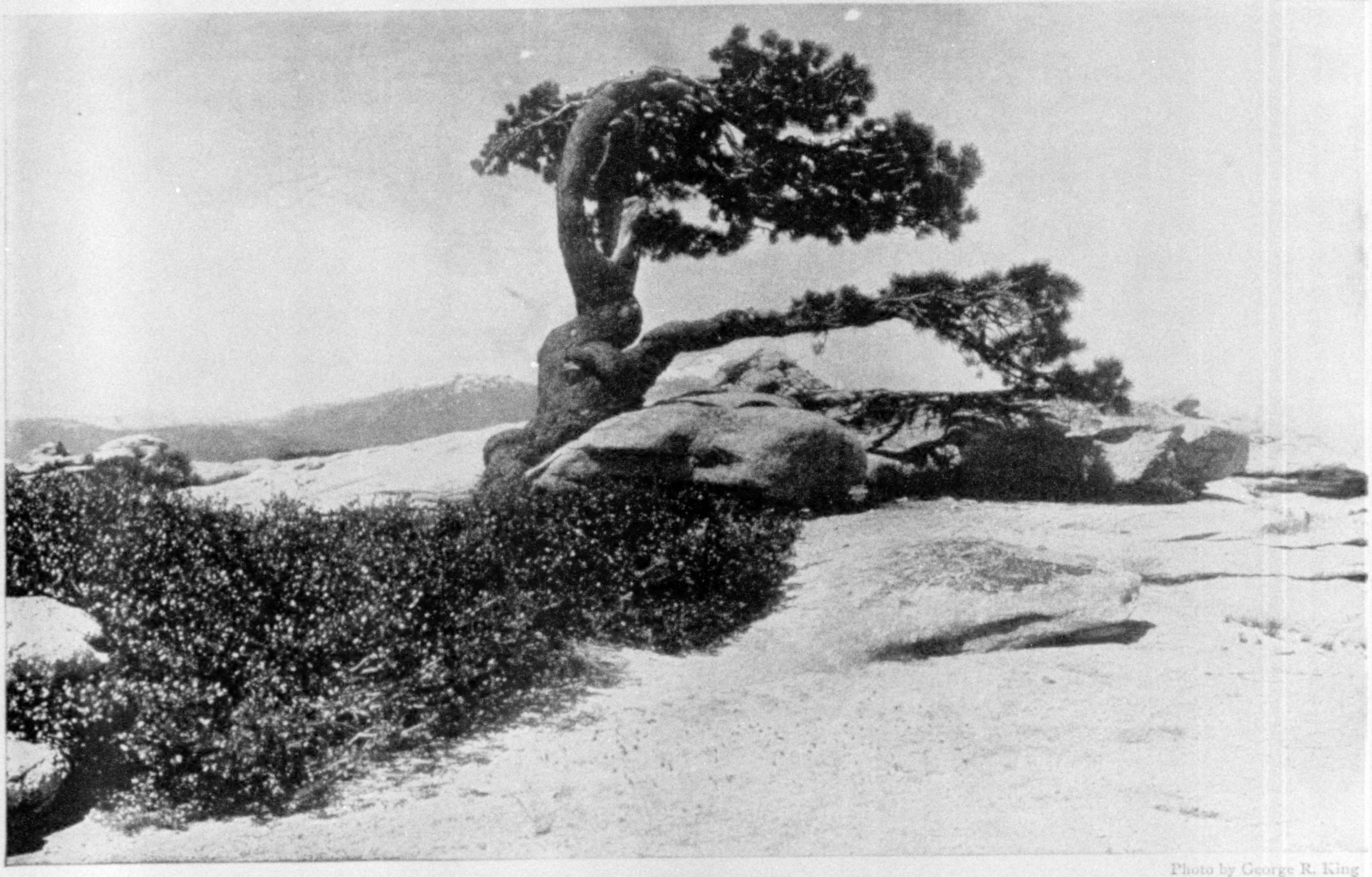

Photo by George R. King

THE SUMMIT OF SENTINEL DOME: YOSEMITE NATIONAL PARK

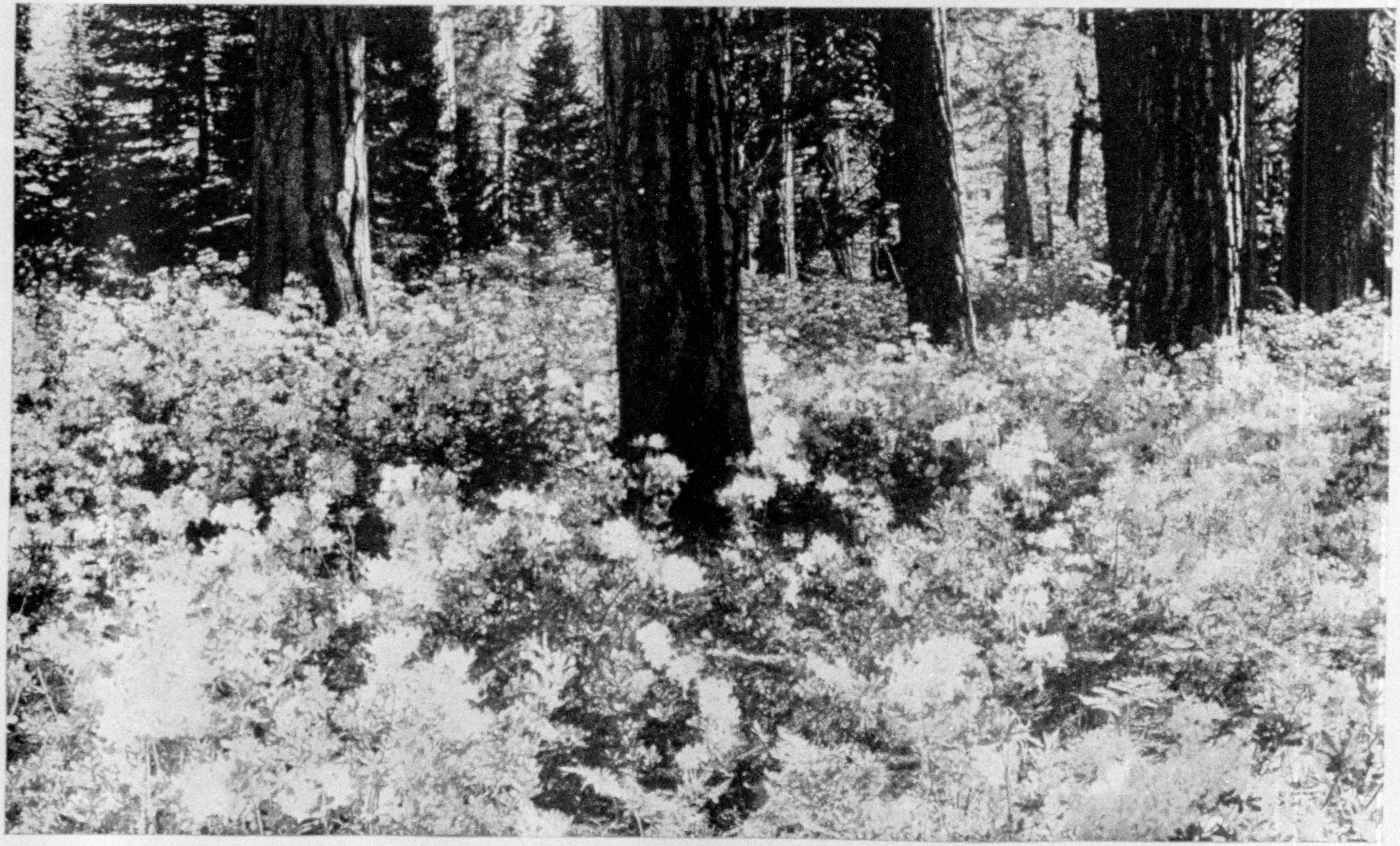

Photo by George R. King

WILD AZALEA IN THE YOSEMITE NATIONAL PARK

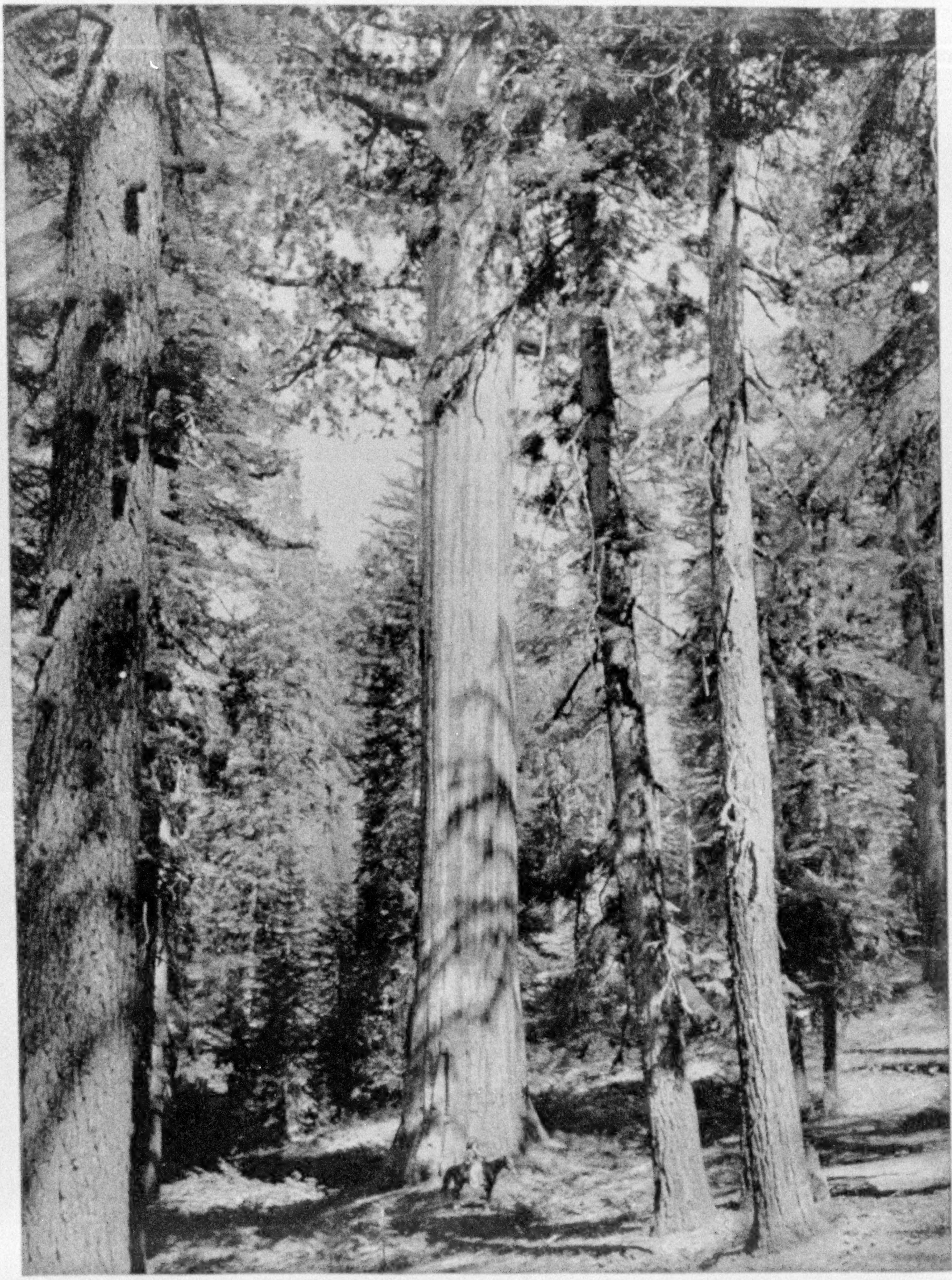

Photo by Southern Pacific R. R. Co.

"FOREST QUEEN": MARIPOSA BIG TREE GROVE, YOSEMITE NATIONAL PARK, CALIFORNIA

Photo by Southern Pacific R. R. Co.

"GENERAL SHERMAN TREE," IN THE GIANT FOREST: SEQUOIA NATIONAL PARK, CALIFORNIA

Note the two human figures on each side of the tree

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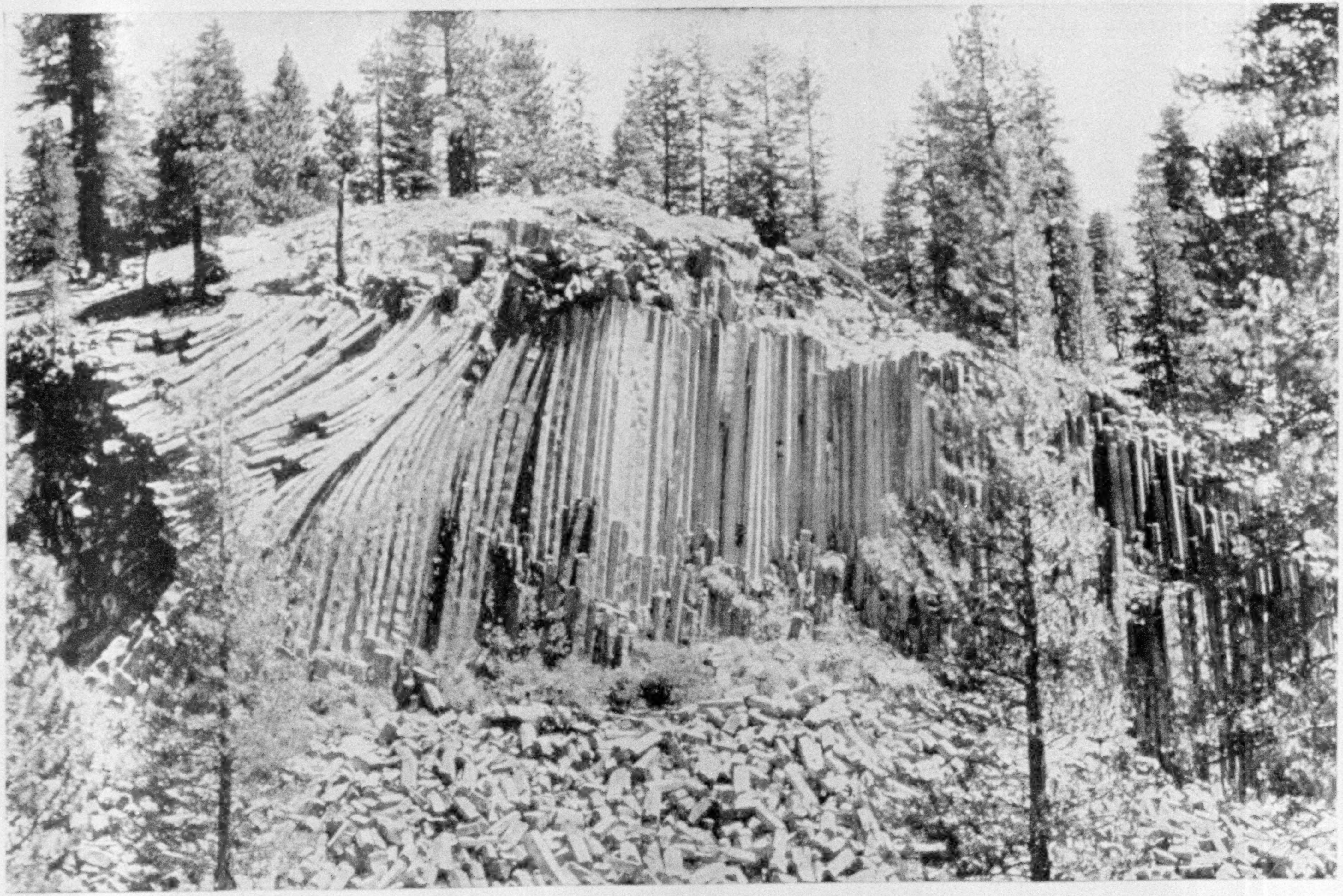
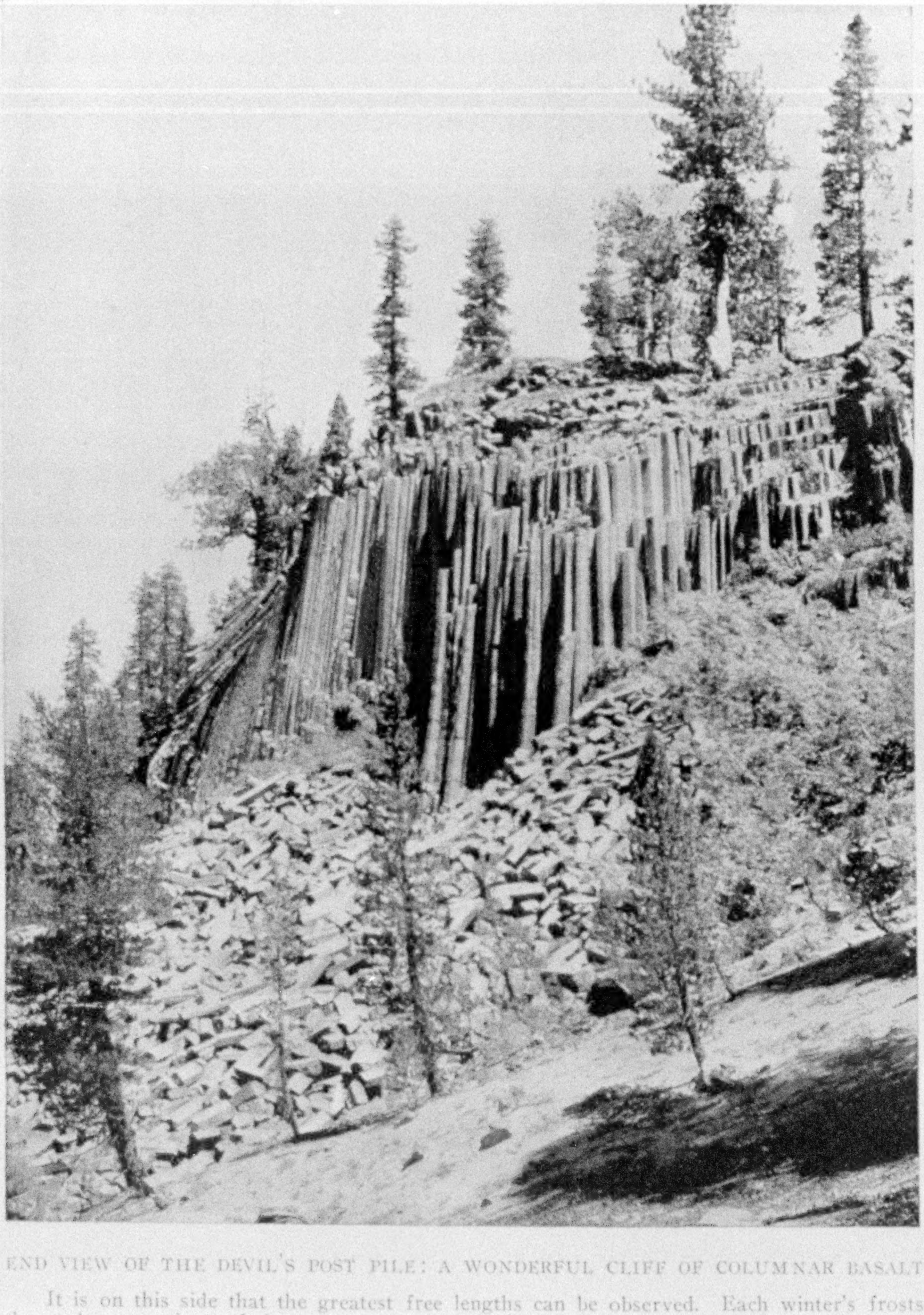


THE DEVIL'S POST PILE: NATIONAL MONUMENT, IN THE SIERRA NATIONAL FOREST

The Devil's Post Pile is a remarkable example of basalt columns, which are fairly regular and ordinarily hexagonal in cross sections, although pentagonal and other shapes are not uncommon. The average diameter is about two feet. The columns, or so-called posts, lie in the pile at all angles, from vertical to almost horizontal. Photo and note by W. L. Huber.



END VIEW OF THE DEVIL'S POST PILE: A WONDERFUL CLIFF OF COLUMNAR BASALT

It is on this side that the greatest free lengths can be observed. Each winter's frosts throw down portions of the outer columns, and, from the size of the pile of fragments at the base, this process must have been going on for centuries. How far the formation extends below the pile of fragments is unknown, but it probably extends a considerable distance. A measurement by the writer (W. L. Huber) showed a maximum vertical length of 50 feet standing free above the pile of fragments. On the top of the pile the ends of a number of the posts are exposed and show unmistakable evidence of glaciation. Most of the post pile and much of the surrounding country are covered with a layer of pumice. This is apparently the product of a volcanic eruption which occurred after the glaciers had receded. Photo and note by W. L. Huber.

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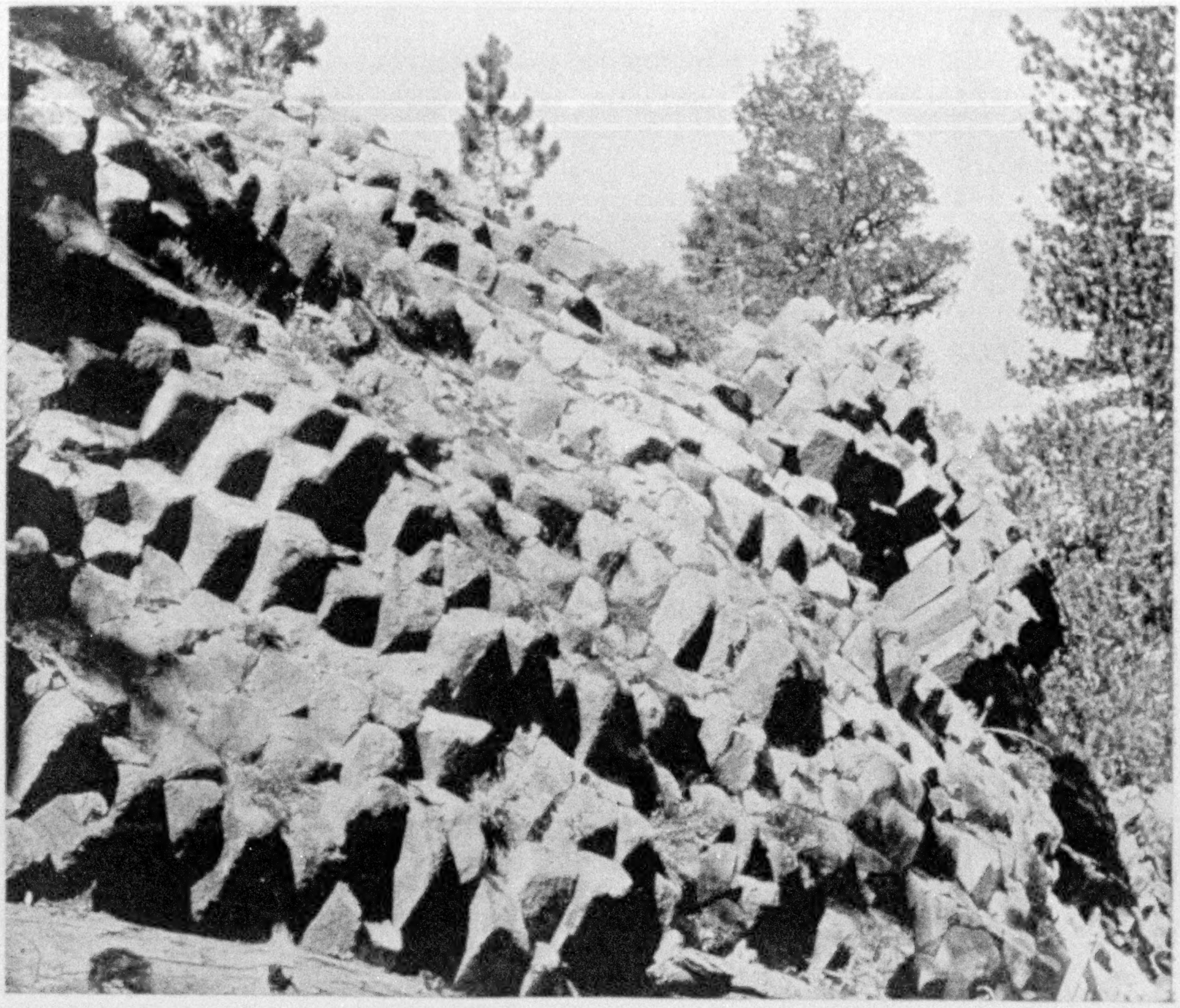

Photo by W. L. Huber

AN END VIEW OF THE DEVIL'S POST PILE

These ruins are situated about 25 miles southwest of Mancos, Colorado. For a distance of 18 miles the government has constructed a wagon road, but the remainder of the distance must be traveled on horseback.

WIND CAVE NATIONAL PARK

Wind Cave National Park, in South Dakota, created by the act of January 9, 1903, is situated 12 miles east of Hot Springs, South Dakota, and has an area of 10,522 acres. Its one attraction is a limestone cave of remarkable beauty, containing many fantastic and peculiar formations. Sullys Hill National Park, in North Dakota, and Platt National Park, in Oklahoma, are of considerable local interest, but present no striking features to make them of general importance. Sullys Hill Park was created by the act of April 27, 1904, and has an area of 780 acres; Platt National Park was created by the acts of July 1, 1902, and April 21, 1904. It has an area of 848 acres.

THE HOT SPRINGS OF ARKANSAS

In the wooded hills of central Arkansas are the hot springs of Arkansas, on a government reservation which is not called a national park and which does not serve exactly the same purpose as the other parks, but whose importance is so great that it should be included in any discussion of the park system.

While the parks are essentially recreation grounds and serve as health restorers only in so far as they give opportunities for outdoor life, the hot springs of Arkansas have been held by the Federal government solely by reason

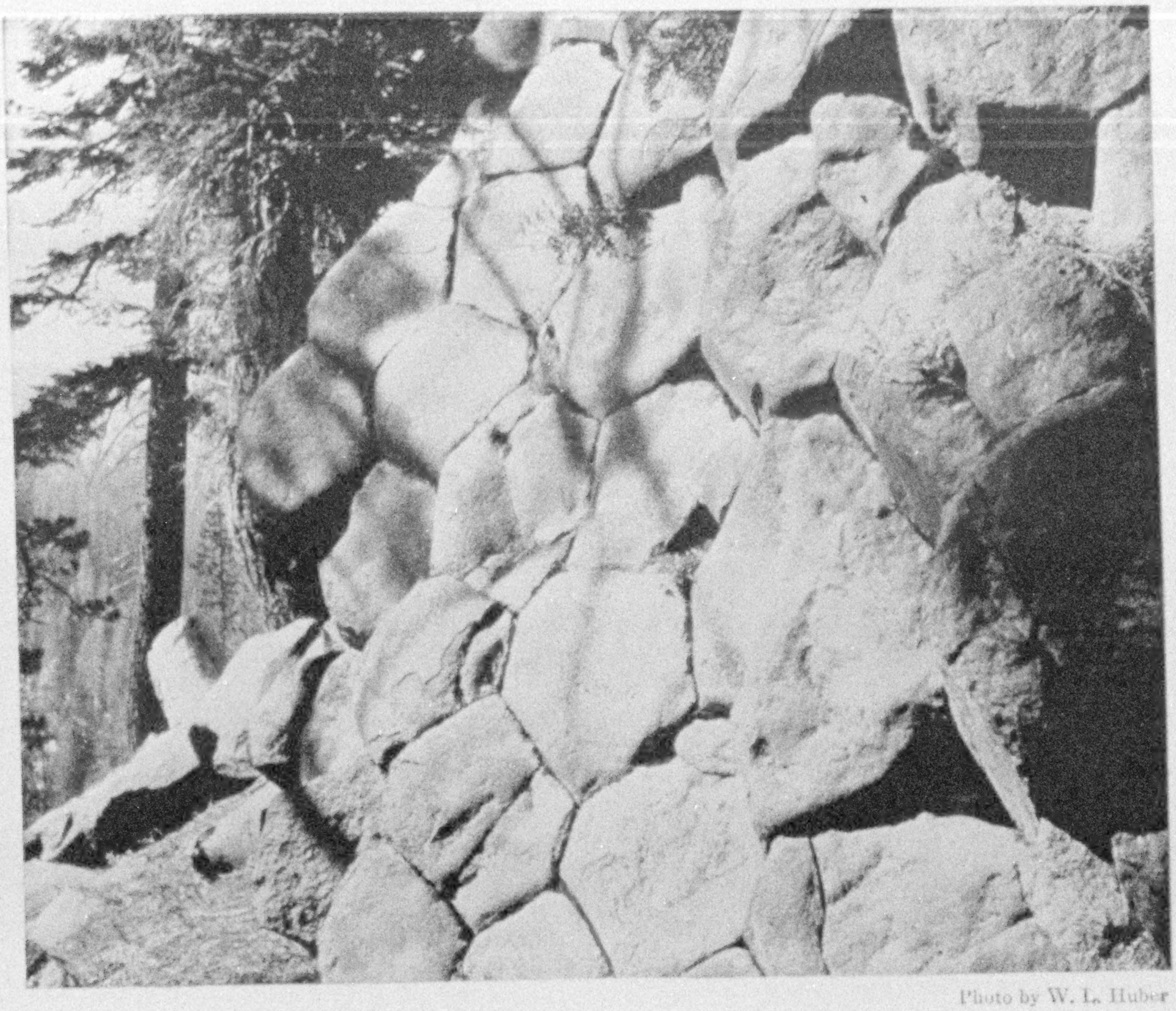

Photo by W. L. Huber

THE DEVIL'S POST PILE, SHOWING REGULARITY OF FORM OF COLUMNS

of the value of the hot waters as remedial agents. The waters of these springs, which are highly radio-active, are administered internally and by immersion through the form of baths.

The attractions of this reservation are the great therapeutic value of the water, the fine climate, and beautiful country in the neighborhood. Overworked business and professional men and all who need rest and recuperation find here forms of recreation that have a powerful influence in the restoration of health and strength.

By the act of April 20, 1832, Congress provided that four sections of land in the Territory of Arkansas, including the springs, a total of 2,560 acres, should be reserved from sale or entry in order that the waters of the springs might be preserved in perpetuity for the benefit of the sick.

When the State of Arkansas was created the Federal government still retained the ownership of the four sections, but did not reserve the jurisdiction. By later acts the size of the reservation was reduced to 911 acres, the present area.

All of the springs are on the reservation, but there has grown up adjacent to it the city of Hot Springs, over which the government has no jurisdiction or control, and in which the conditions have been such that many patients returned home dissatisfied. Through the coöperation of the government, the bath-house lessees, and public-spirited citizens, the conditions that caused so much adverse comment have largely passed away.

Under the supervision of a medical director appointed by the government, the sanitary conditions in the bath-houses have been materially improved. Some of the houses have been extensively remodeled and others have been torn down

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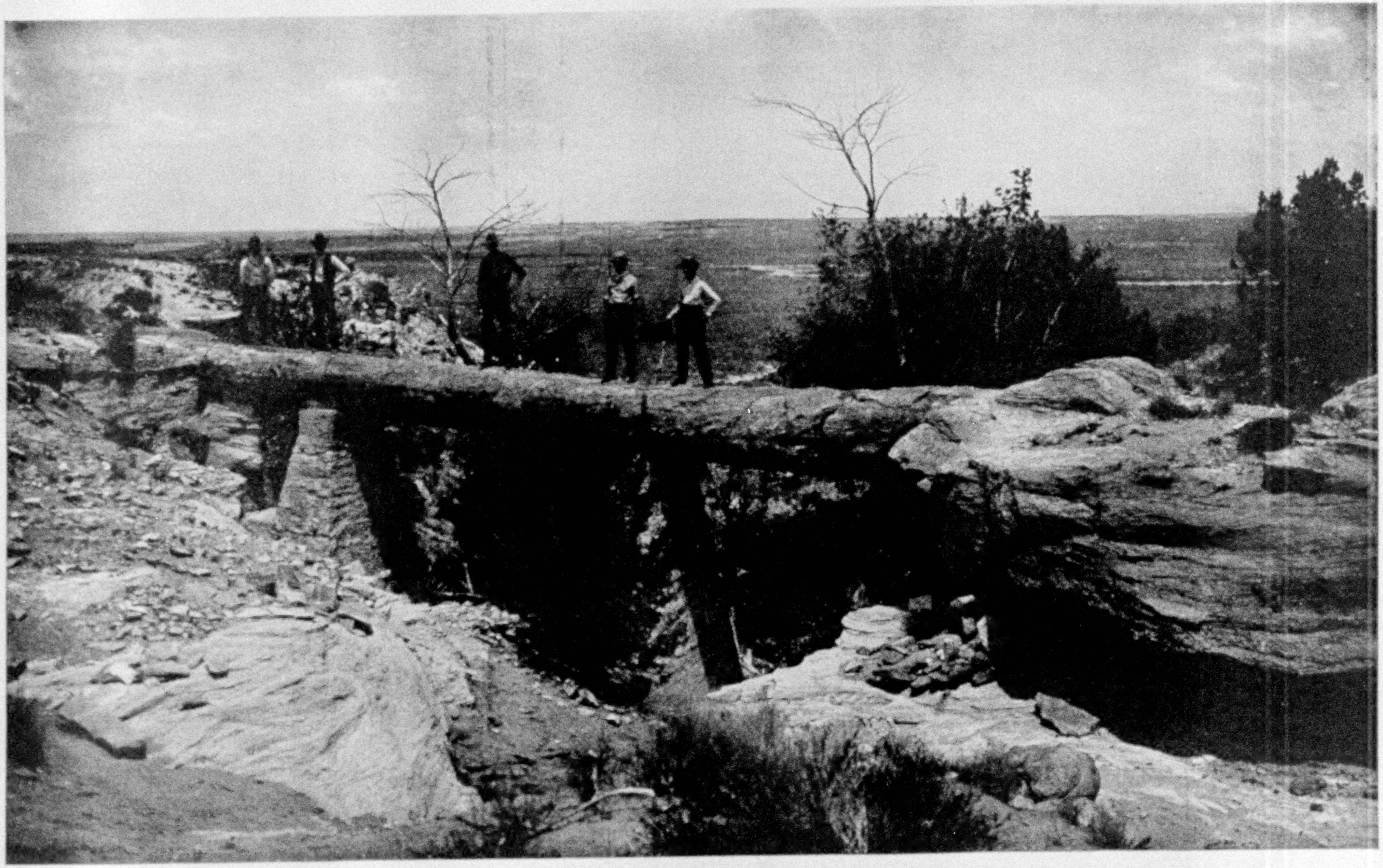

Photo by George R. King

SCENE IN THE PETRIFIED FOREST OF ARIZONA, ONE OF OUR 28 NATIONAL MONUMENTS (SEE PAGE 575)

The Petrified Forest in Arizona contains a large quantity of petrified trees, none of which stand erect in place, as do many of the petrified trees in the Yellowstone National Park. The most prominent specimen is this great trunk, which forms a bridge across a canyon 45 feet in width

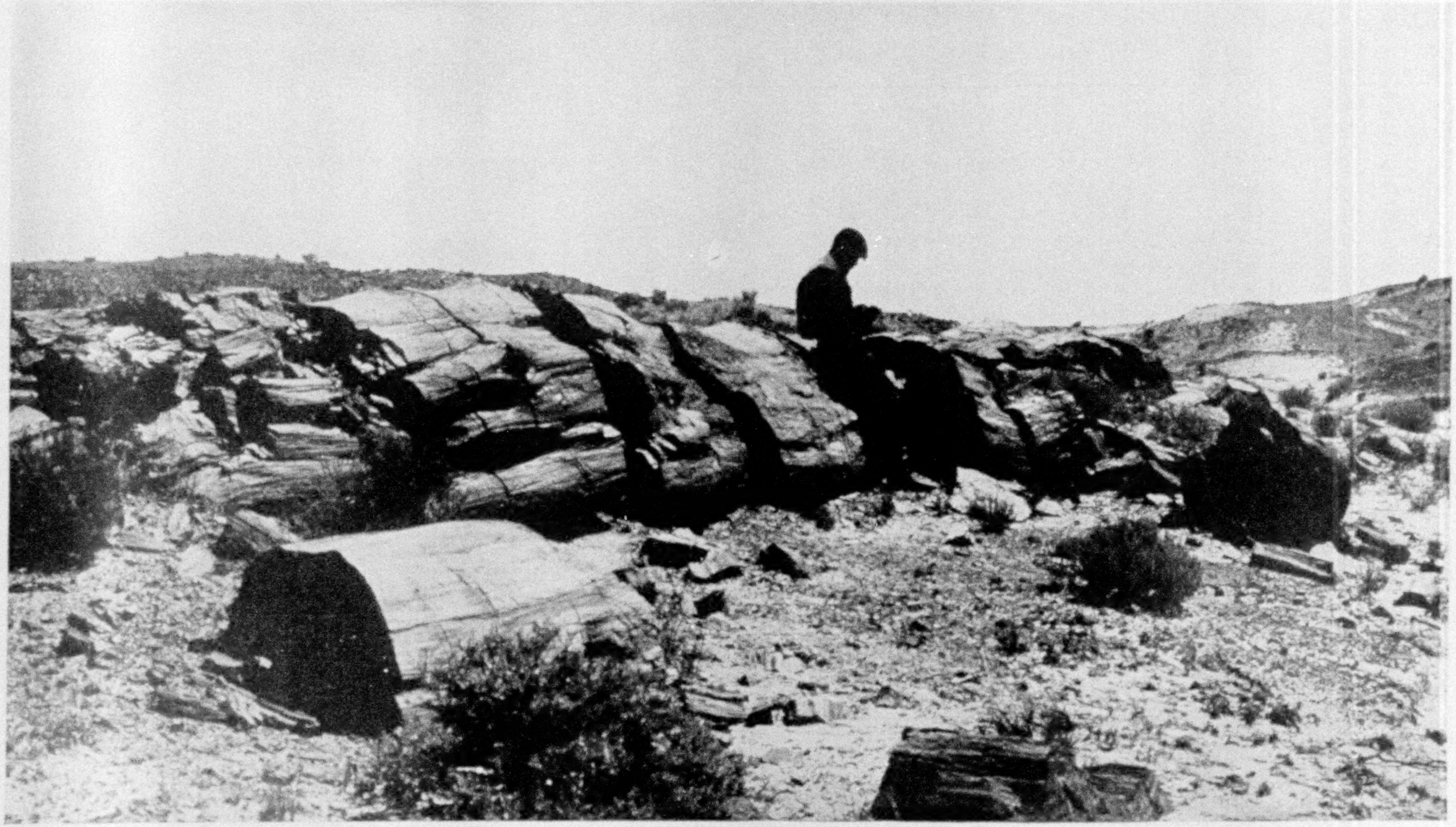

Photo by George R. King

THE GREAT LOG IN BLUE FOREST, IN THE FOSSIL FOREST OF ARIZONA

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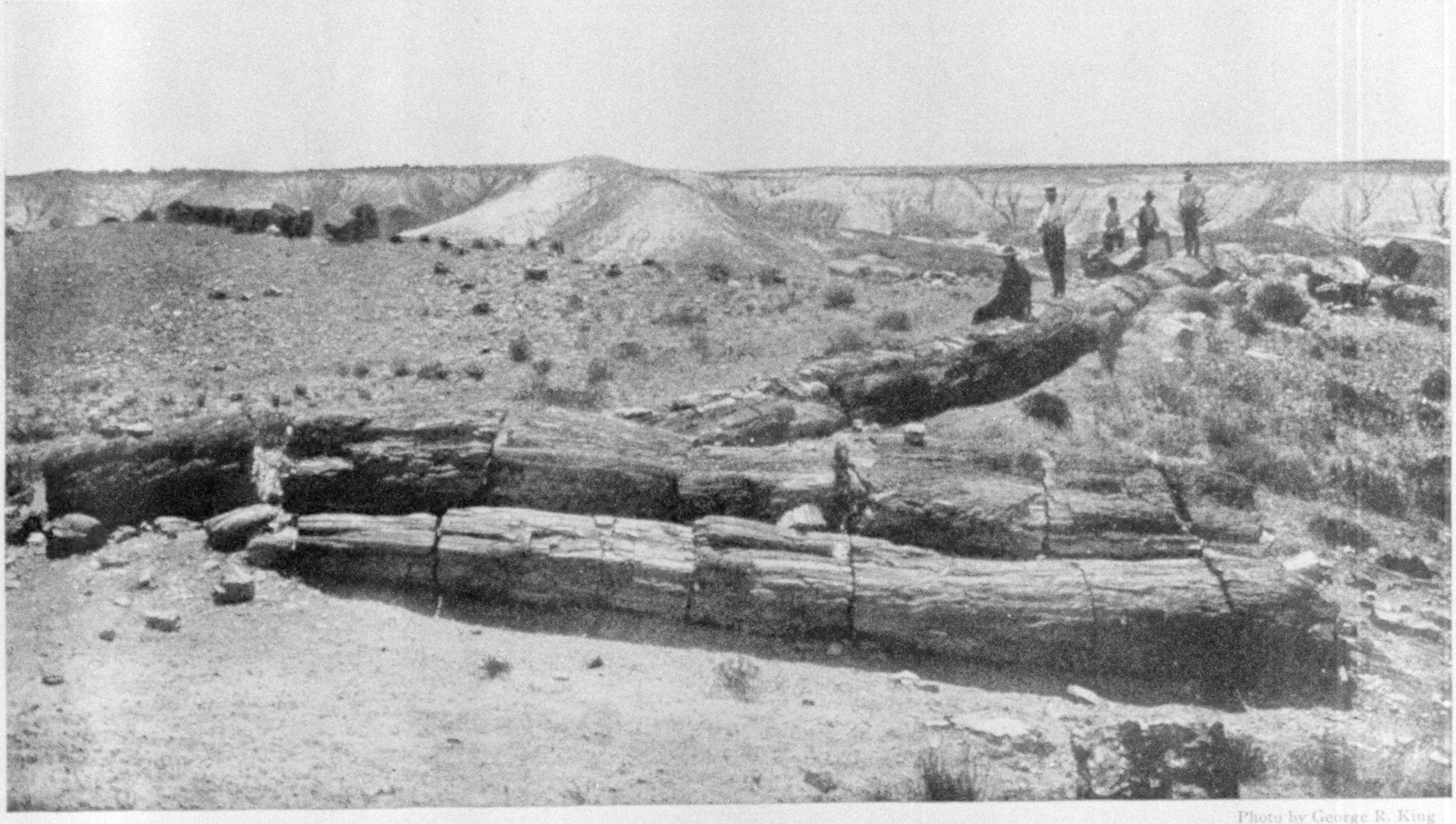

Photo by George R. King

ANOTHER VIEW IN THE FOSSIL FOREST OF ARIZONA, WHICH IS NOW A NATIONAL MONUMENT (SEE PAGE 577) to make place for new ones. Two bath-houses, equal if not superior to any in the world, have recently been opened, and one other bath-house is under construction; two more are being extensively remodeled.

The government is at present doing everything in its power to develop those environments which aid in the restoration of health and to destroy those which are deleterious. The wonderful results effected by these waters bid fair to make the Hot Springs of Arkansas one of the world's great health resorts.

THOUSANDS OF VISITORS

All the national parks described above are under the administration and control of the Secretary of the Interior. Troops of cavalry patrol the Yellowstone, the Sequoia, the General Grant, and the Yosemite parks. The commanding officer, who is the acting superintendent, reports to the Secretary of the Interior on matters of civil administration and to the Secretary of War on matters of military routine. In the Yellowstone Park there is a still further division of authority by the fact that all road construction, bridge building, and road sprinkling are under the supervision of the Engineer Corps of the Army. In the other parks all the employees are appointed from civil life and report directly to the Secretary of the Interior.

The number of visitors to the parks, not including the Hot Springs reservation, has increased from 30,000 in 1906 to 93,000 in 1911, and the growth of the park work has been such that the small force in the office of the Secretary of the Interior is not deemed sufficient to cope with the increasing number of problems presented, and bills have been introduced in the Senate and House of Representatives for the creation of a bureau of national parks. The creation of such a bureau has been urged by Secretary of the Interior Walter L. Fisher in his annual report for 1911, and by President Taft. The latter, in a special message, February 2, 1912, referred to the parks as follows:

"I earnestly recommend the establishment of a bureau of national parks. Such legislation is essential to the proper management of those wondrous manifestations of nature, so startling and so beautiful that every one recognizes the obligations of the government to preserve them for the edification and recreation of the people. The Yellowstone Park, the Yosemite, the Grand Canyon of the Colorado, the Glacier National Park, and the Mount Rainier National Park, and others furnish appropriate instances.

"In only one case have we made anything like adequate preparation for the use of a park by the public. That case is the Yellowstone National Park. Every consideration of patriotism and the love of nature and of beauty and of art requires us to expend money enough to bring all these natural wonders within easy reach of our people. The first step in that direction is the establishment of a responsible bureau which shall take upon itself the burden of supervising the parks and of making recommendations as to the best method of improving their accessibility and usefulness."

OUR NATIONAL MONUMENTS

In addition to the national parks, there are 28 national monuments that have been created by executive proclamation, in accordance with the provisions of the act of June 8, 1906, which provides that national monuments may be created by the President to include landmarks, historic and prehistoric structures, and other objects of historic or scientific interest that are situated upon lands owned or controlled by the government of the United States. The act also provides that private lands may be relinquished to the United States, and that the Secretaries of the Interior, Agriculture, and War may make regulations governing the examination and excavation of ruins and the collection of objects of antiquity.

While the act provides for fine or imprisonment for injury to any of the ruins or natural objects within the boundaries of these monuments, Congress has never made an appropriation for supervision and protection; consequently much difficulty has been experienced in protecting these monuments

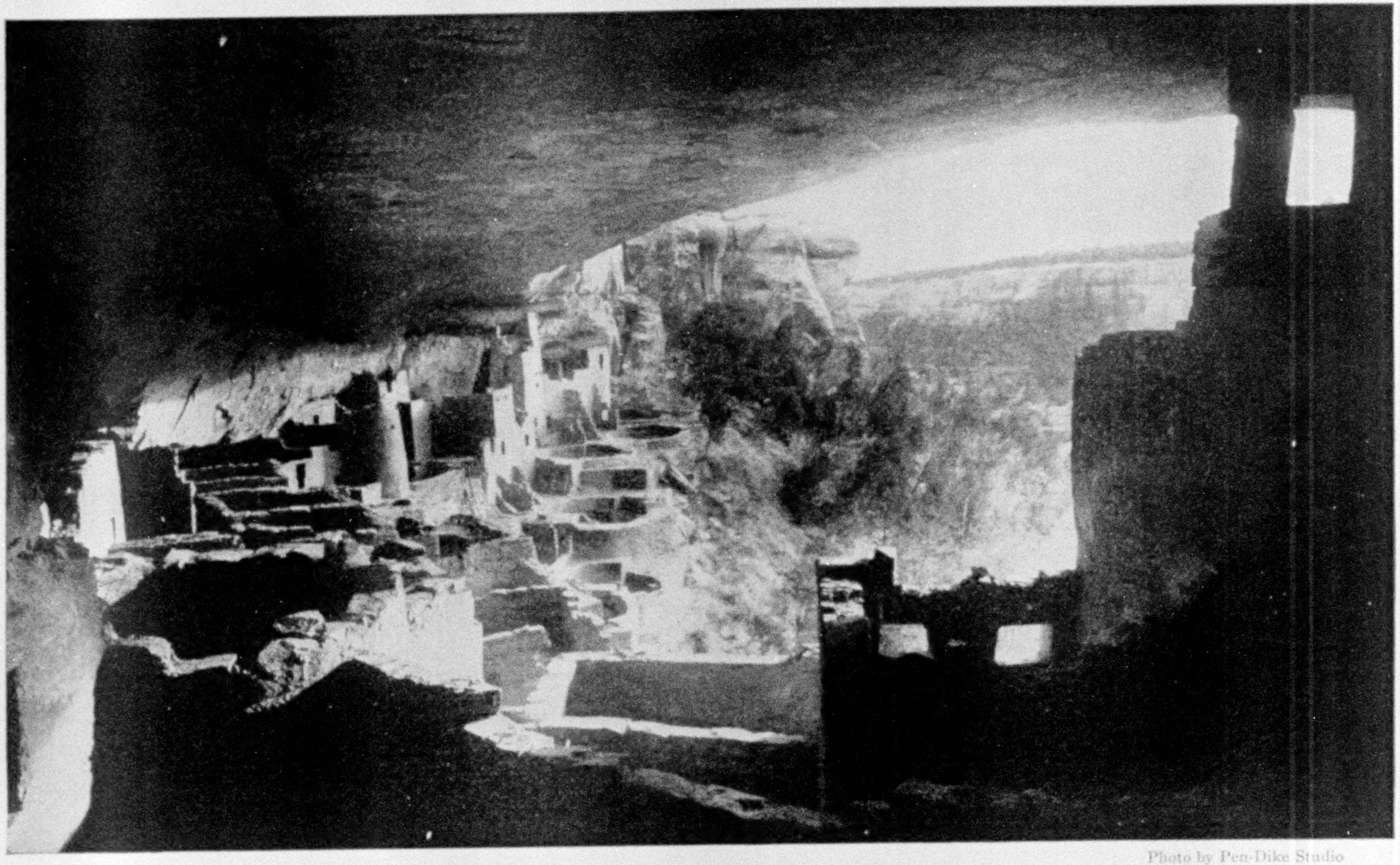

Photo by Pen-Dike Studio

CLIFF PALACE, LOOKING SOUTH: IN THE MESA VERDE NATIONAL PARK

"In southwestern Colorado the dwellings of the extinct race of cliff-dwellers are preserved in the Mesa Verde National Park, established by the act of June 29, 1906. In the 42,376 acres included in this park there are about 400 cliff-houses of varying size. The period at which these cliff dwellings were occupied and the cause of the depopulation are unknown, but there is no doubt that the buildings are prehistoric. The most impressive ruin in the park is Cliff Palace, a structure about 300 feet in length, built under the roof rock of an enormous cave. This ruin contains 146 living-rooms, including numerous large chambers used for assembly-rooms for the purpose of worship or council" (see page 563).

from vandalism, unauthorized exploration, and spoliation. For this reason 10 of the monuments that are situated within national forests have been placed under the supervision of the Secretary of Agriculture, one under the Secretary of War, and the remaining 17 under the direction of the Secretary of the Interior.

Of the national monuments under the administration of the Secretary of the Interior the most striking are the Natural Bridges and Rainbow Bridge in Utah, El Morro in New Mexico, the Muir Woods in California, and the Petrified Forest in Arizona.

The Natural Bridges Monument, which is located in southwestern Utah, includes the three largest natural bridges that have been discovered. The Augusta Natural Bridge, the largest of the three, is a splendid arch of solid sandstone, measuring 335 feet from wall to wall and having below it a clear opening of 357 feet. It is more than three times as high and has twice the span of the celebrated natural bridge in Virginia; it would overspan the Capitol at Washington and clear the top of the dome by 51 feet.

The Rainbow Bridge is near the southern boundary of Utah, and is unique in that it not only forms a symmetrical arch on its under side, but presents also a curved surface above, and this resembles in shape a rainbow. It is 309 feet above the surface of the water and has a span of 278 feet.

Illustrations and full descriptions of these bridges have been published in recent numbers of this Magazine.*

El Morro is an enormous sandstone rock, in western New Mexico, that has been eroded in such fantastic forms as to give it the appearance of a great castle; hence the origin of its Spanish name. A small spring of water found existing at the rock made it a convenient camping place for the Spanish explorers of the 17th and 18th centuries, who carved on its face many inscriptions that are of great importance to the early history of the southwest. As there has heretofore been no local custodian, the rock is exposed to vandalism and the inscriptions are threatened with destruction by thoughtless visitors.

The Muir Woods National Monument is situated near the city of San Francisco and includes one of the most noted redwood groves in the State of California. The tract contains many trees more than 300 feet high, with a diameter of 18 feet or more at the butt. It was presented to the United States by William Kent.

The Petrified Forest in Arizona contains a large quantity of petrified trees, none of which stand erect in place as do many of the petrified trees in the Yellowstone National Park. The most prominent specimen is a great trunk, which forms a bridge across a canyon 45 feet in width (see page 572).

The other national monuments under the supervision of the Secretary of the Interior are as follows: The Devils Tower, a landmark in Wyoming; Montezuma Castle, Tumacacori, Chaco Canyon, and Gran Quivira in New Mexico; and Navajo in Arizona, prehistoric or Spanish ruins; Pinnacles in California, a group of spirelike formations underlain by caves; Mukuntuweap in Utah, a peculiar and beautiful gorge; Shoshone Cavern in Wyoming and Lewis and Clark Cavern in Montana, limestone caves of great beauty; Sitka in Alaska, an area containing some of the finest totem poles known; Colorado in western Colorado, an area of eroded monoliths similar to the well-known Garden of the Gods near Colorado Springs.

The national monuments administered by the Secretary of Agriculture are as follows: Lassen Peak and Cinder Cone in California, volcanic areas of great scientific interest; Gila Cliff Dwellings in New Mexico and Tonto in Arizona, prehistoric ruins; Jewel Cave in South Dakota and Oregon Caves in Oregon, limestone caverns of considerable extent; Mount Olympus in Washington, the summer range and breeding ground of the Olympic elk; Wheeler in Colorado* and Devils Post Pile in California,

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*Described in the NATIONAL GEOGRAPHIC MAGAZINE, November, 1911, "The Great Rainbow Natural Bridge," by Joseph E. Pogue.

*See NATIONAL GEOGRAPHIC MAGAZINE, September, 1909, "The Wheeler National Monument."

Photo by George R. King

MOUNT SHASTA

"At the south, and well beyond the Oregon-California border, rises Mount Shasta, where the Cascades and the Sierras unite, guardian monarch to the northward as well as over a vast California domain" areas containing peculiar rock formations; the Grand Canyon in Arizona, the largest and most impressive gorge in the world. Several bills have been introduced in Congress to make a national park of the Grand Canyon, but none of them has become law.

The Big Hole Battlefield National Monument in Montana, which is under the supervision of the War Department, includes an area surrounding a stone monument erected in memory of the men killed at the battle of the Big Hole during the Nez Percez Indian War of 1877.

SCENES AMONG THE HIGH CASCADES IN CENTRAL OREGON

By Ira A. Williams, of the Iowa State College

A GLANCE at any map of Oregon will recall the general arrangement of its surface features. The State is separated into two major provinces by the main axis of the Cascade Range, which extends in an almost due north-south direction from the Columbia River to the California boundary.

This "backbone" is marked by a succession of prominent mountain peaks, with snow-capped Mount Hood, at 11,225 feet, standing sentinel at the northern end of the series. At the south, and well beyond the Oregon-California border, rises Mount Shasta, where the Cascades and the Sierras unite, guardian monarch to the northward as well as over a vast California domain.

Between these termini the broken crest-line of the range consists of successive volcanic peaks, interspersed with more or less level spaces, due either to expansive mountain parks and meadows or to broad, barren, lava-covered areas. The whole range has been largely built by the eruption and outspreading of volcanic materials, and every peak that today appears along its picturesque sky-line marks the site of a former opening from which the materials of construction issued (see map on page 626).

Chief among the prominent points of the range, in its 250-mile stretch across Oregon, are Mount Jefferson, with an altitude of 10,350 feet; the Three Sisters peaks, each approximately 10,250 feet high; Diamond Peak, 8,250 feet; Mount Thielsen, 9,250 feet in height; and, at the south end of the range, Mount Pitt, which rises 9,760 feet above the sea. Mount Mazama should also be mentioned. It stands next to Mount Pitt, at the south, and its crater is occupied by the celebrated Crater Lake.

All of these and scores of others are the broken remnants of once active volcanoes. Of those mentioned, the five highest are snow-mantled and known to bear one or more living glaciers on their slopes.

It is an observation of considerable interest that, south of the Columbia, no river has yet managed to break through this vast barrier, and for many portions of the summit of the range but poor surface drainage is provided. Barrier lakes, formed through interference with former drainage-ways by volcanic processes and occasionally by glacial action, are therefore plentifully distributed along the higher slopes of the range across the State.

Few of the many prominent peaks of the high Cascades in Oregon have been fully explored. With the exception of Mounts Hood and Mazama, which have been rendered accessible through both Federal and private enterprise, the other conspicuous peaks of the range can be reached only by expeditions organized for the purpose. Rarely are they visited by the individual.

While portions have been mapped by the government topographers and members of the forest service, perhaps the most signal results have been accomplished among the less accessible of the glacier peaks by a mountain-climbing organization, the Mazama Club of Portland. It is an outing club, whose advent dates back to 1894, when its formation was effected on the summit of Mount Hood. Similar in purpose to its sister organizations, the Sierra Club of California and the Alpine Club of Canada, its principal work is the exploration of and acquisition of knowledge concerning the high mountains of the north Pacific coast.

The word Mazama is adapted from "mazame," which is popularly said to refer to the mountain goat[*] (*Haplocerus montanus*) indigenous to the high cordillera. The aims of the club and the conditions of membership may be best stated by reference to its by-laws:

"The objects of this organization shall be the exploration of snow peaks and other mountains, especially of the Pacific Northwest; the collection of scientific knowledge and other data concerning the same; the encouragement of annual expeditions with the above objects in view; the preservation of the forests and other features of mountain scenery, as far as possible, in their natural beauty; and the dissemination of knowledge concerning the beauty and grandeur of the mountain scenery of the Pacific Northwest.

"Any person who has climbed to the summit of a perpetual snow peak, on the sides of which there is at least one living glacier, and to the top of which a person cannot ride, horseback or otherwise, shall be eligible to active or life membership."

The Mazamas claim credit for having successfully ascended at least 20 of the highest mountains of Washington, Oregon, and California. Among the number are included several first ascents. The photographs accompanying this paper were taken during the 17th annual outing of the club on and in the vicinity of the Three Sisters peaks, in central Oregon.

The Three Sisters region is approached most readily by the Eugene-Prineville trail, the long-established highway across the range between Eugene, a point in the Willamette Valley on the main line of the Southern Pacific Railway, and Prineville, in the upper Deschutes Valley east of the divide. From Eugene this trail ascends the McKenzie River for 70 miles. After leaving this stream near Belknap Springs it climbs in an additional 15 miles to an elevation of about 6,000 feet, at the summit of the range.

The McKenzie River is the largest of the headwaters of the great Willamette, and all of its upper course is through the heavy untouched forests of firs, cedars, pine, and hemlocks within the Federal forest reserve.

From a point in Lake Valley some 10 miles short of the divide, styled "Frog Camp," a horse trail leads a few miles southeastward across a barren lava flow and White Branch Creek to the timber-line, at 7,750 feet, and to within about three miles of the nearest member of the group, Middle Sister.

Long ere this point has been reached, however, thrilling glimpses of the snow-mantled Sisters may be caught through opening vistas in the forest screen, but it is only with the forest largely behind that the individual peaks rise in their real glory, aproned in green and gleaming snow-limned against the eastern sky.

More pleasant and satisfactory camp sites need not be sought than are available within the fringing timber border. Here the predominating lodge-pole pines and subalpine firs contribute an abundance of fuel, and the innumerable ice-cold streams originating in the perennial snows above furnish a second all-essential element of physical comfort. Thoroughly watered and protected from the agents that threaten removal, the forest mold where exposed to sunlight is usually carpeted with a sod of green. As the snows of winter depart the green is early decorated with an exquisite sprinkling of crimson "painted hats," purple violets, and just a sufficient perspective of unassuming buttercup yellow to gratify, in its setting, even the more fastidious of esthetic senses.

Hundreds of mountain streams of all dimensions make their way from the dissolving snows down the lower slopes, at

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[*] As a matter of fact "mazame" refers to the prong-horn antelope of the plains, *Antilocapra americana*.

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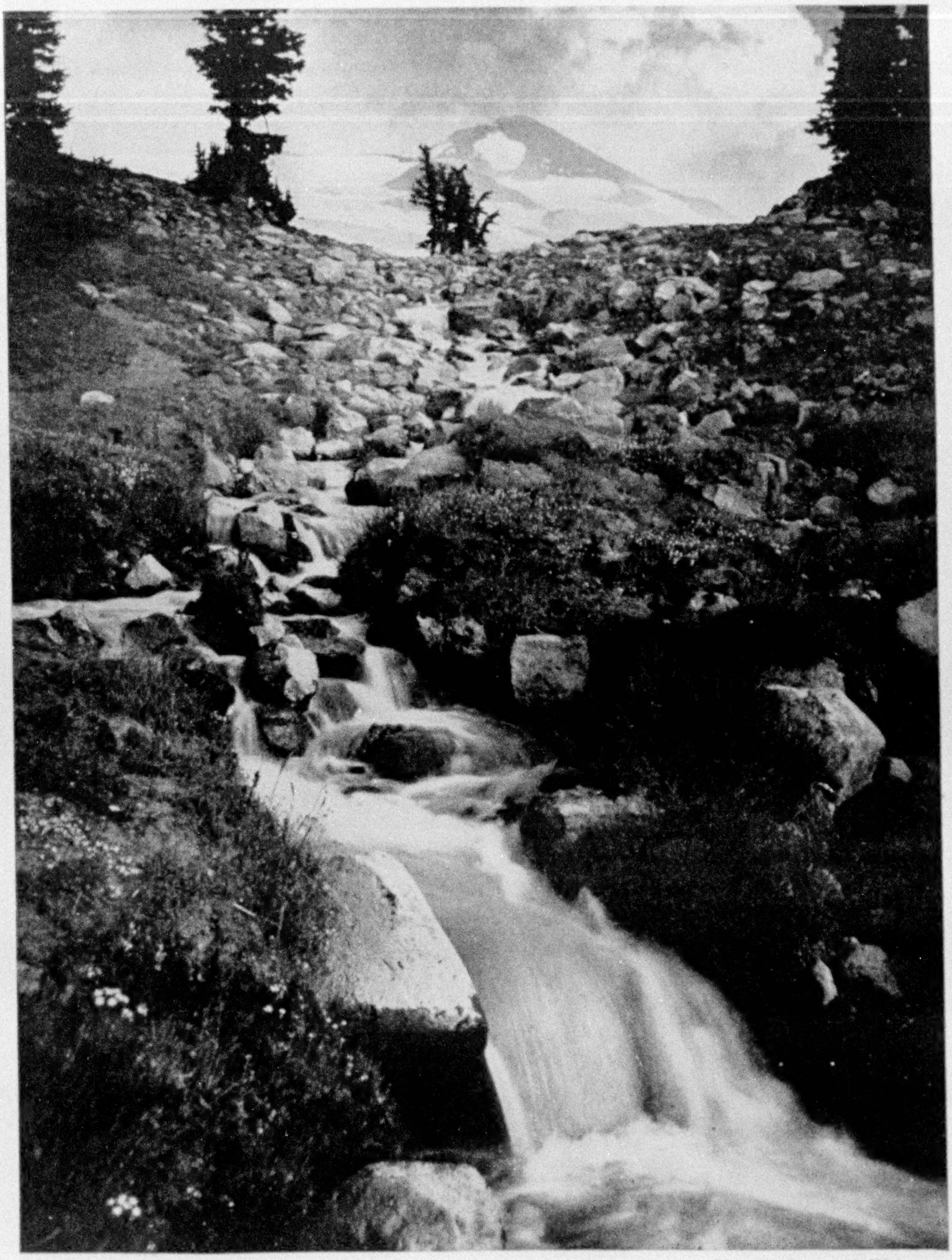
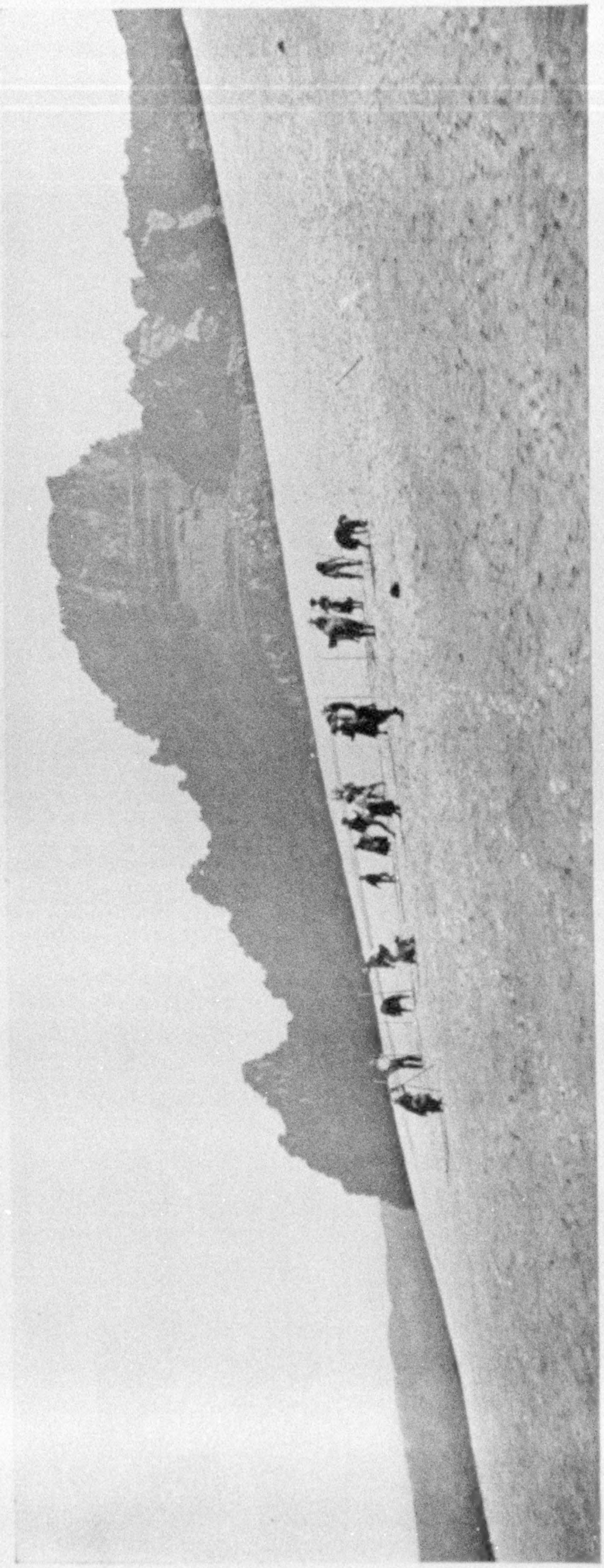


Photo by George M. Weister

A GLACIAL TORRENT FROM MIDDLE SISTER: COLLIER GLACIER AT LEFT, RENFREW AT RIGHT

White Branch Creek runs white with glacial sediment in the late day and early night, but is clear in the morning and forenoon. Note that the flowers of springtime are in blossom here in August. "Hundreds of mountain streams of all dimensions make their way from the dissolving snows, at times whipped into foaming turbulence as they dash over stretches of steep stony bed."



SNOW-BALLING IN AUGUST: SNOW FIELD OF RENFREW GLACIER

"Emerging promontories of towering proportions, and displaying conspicuous structural peculiarities, are also objects of interest"

Photo by George M. Weister

times whipped into foaming turbulence as they dash over stretches of steep stony bed, and again placidly winding a sinuous course through level reaches of grassy meadow.

Many of them come from the tips of melting glaciers. The latter in their forward movement pulverize to a "flour" portions of the rock surfaces over which they flow. As a result the streams issue surcharged with fine sediment, which gives to them a strong whitish or milky appearance.

In the smallest streams this milkiness is most apparent late in the day, while during the early morning and forenoon the water runs perfectly clear, a phenomenon due no doubt to the influence of the heat of the day on the volume of the flow and therefore on the stream's ability to carry the sediment given to it.

The Sisters peaks occupy the apices of a flatly triangular area, the shortest distance between angles being about 5 miles, from North to South Sister. Middle Sister stands intermediate and but slightly out of line to the west.

These three points mark the roughly curved boundaries of a former vast amphitheater, in which the snows of ages past accumulated to form a large glacier that flowed eastward down the mountain slopes. The extension of this ancient ice-stream to a distance of at least 10 miles from its source is today indicated by the presence of massive mo-

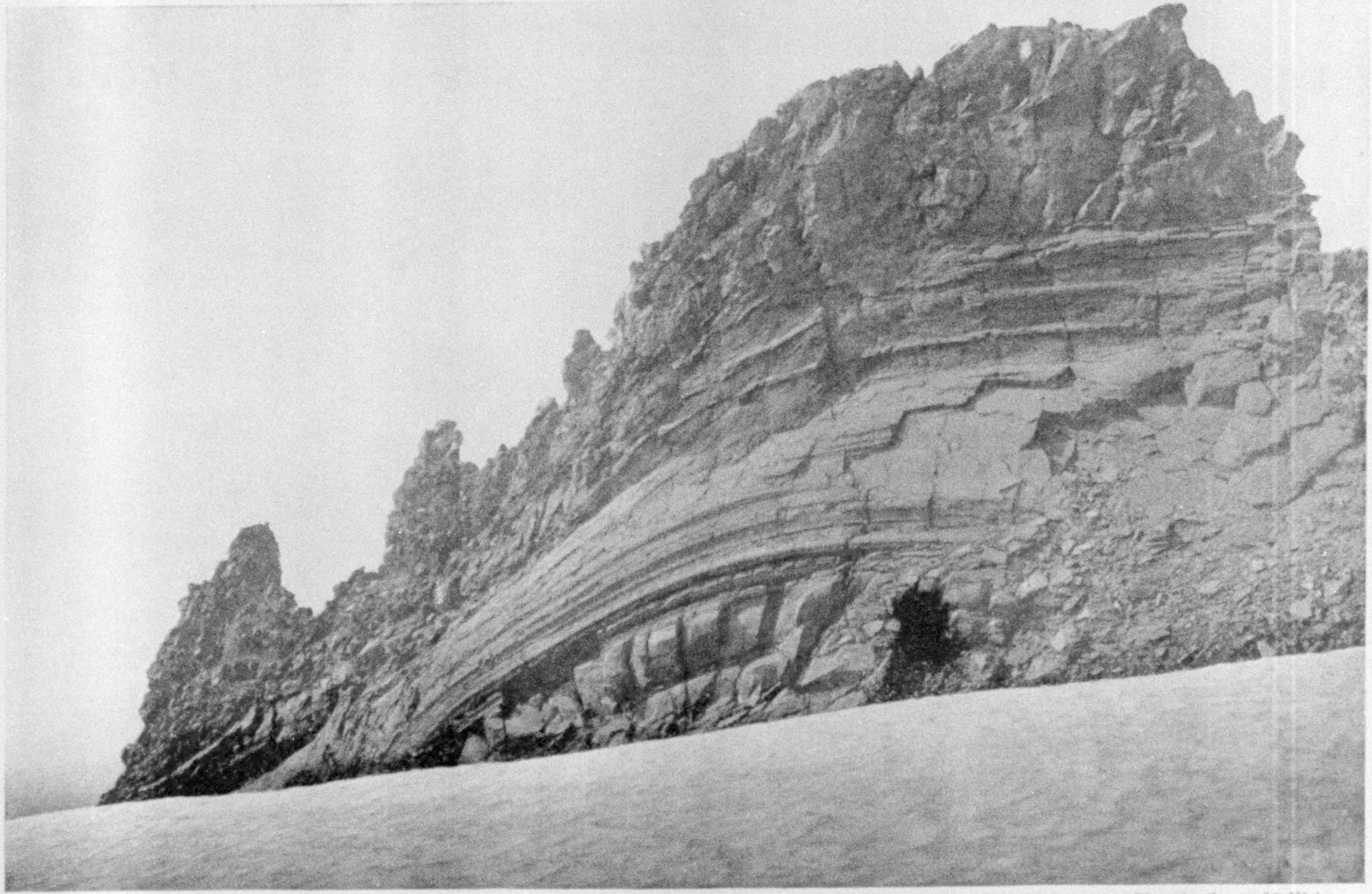


Photo by George M. Weister

RAINBOW ROCK, ON THE WEST SLOPE OF MIDDLE SISTER: NOTE THE SLATY JOINTED EXFOLIATION AT THE RIGHT

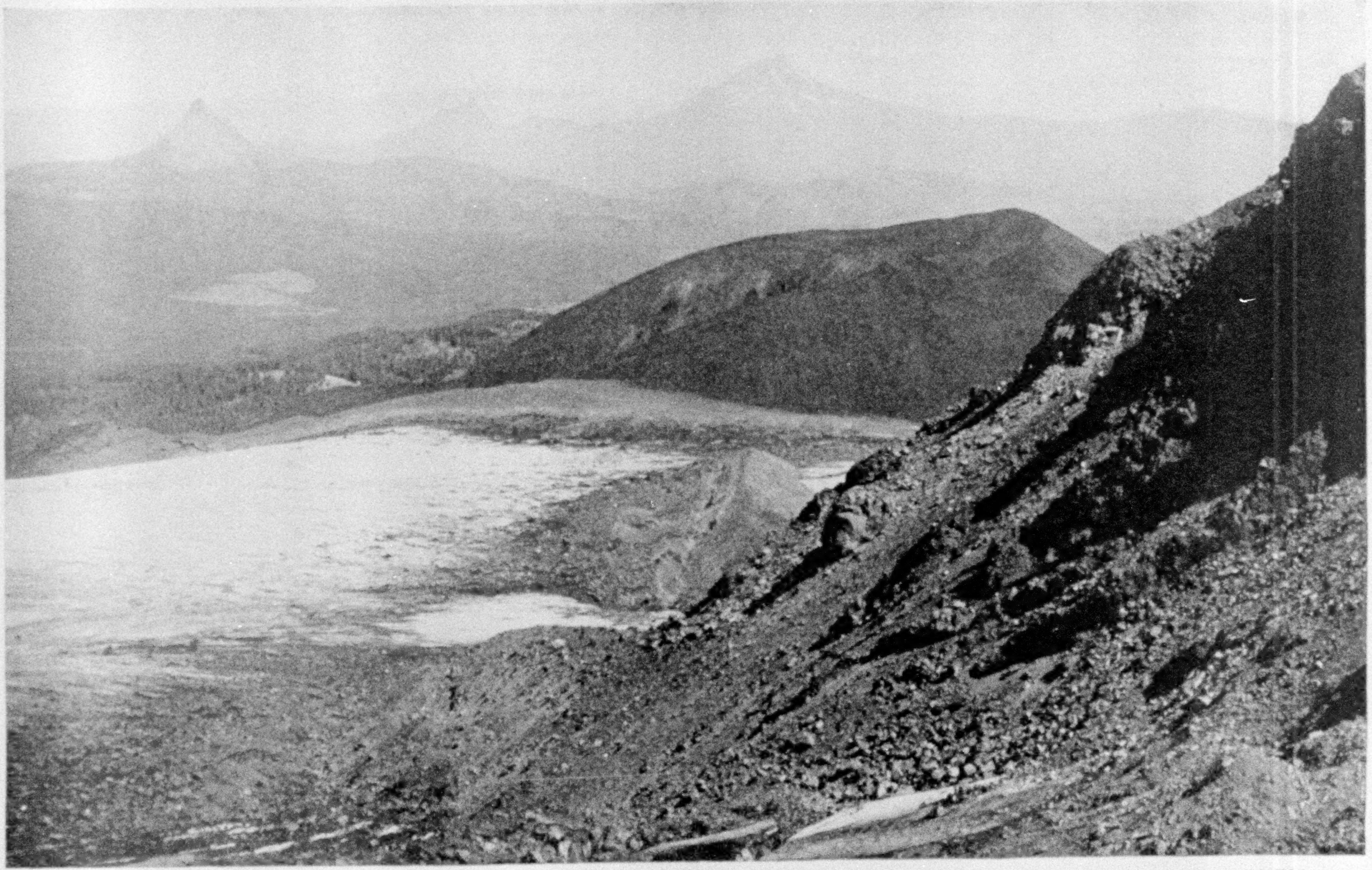


Photo by George M. Weister

LOOKING NORTHWARD ALONG THE CREST OF THE CASCADE RANGE: COLLIER GLACIER AT LEFT; NOTE DOUBLE-CRESTED LATERAL MORAINE IN MIDDLE FOREGROUND

"In all the splendor of their frigid though summer garb appear Mount Washington, Three-fingered Jack, the glacier-scored snow pyramid of splendid Mount Jefferson and Mount Hood, 100 miles distant" (see page 593)

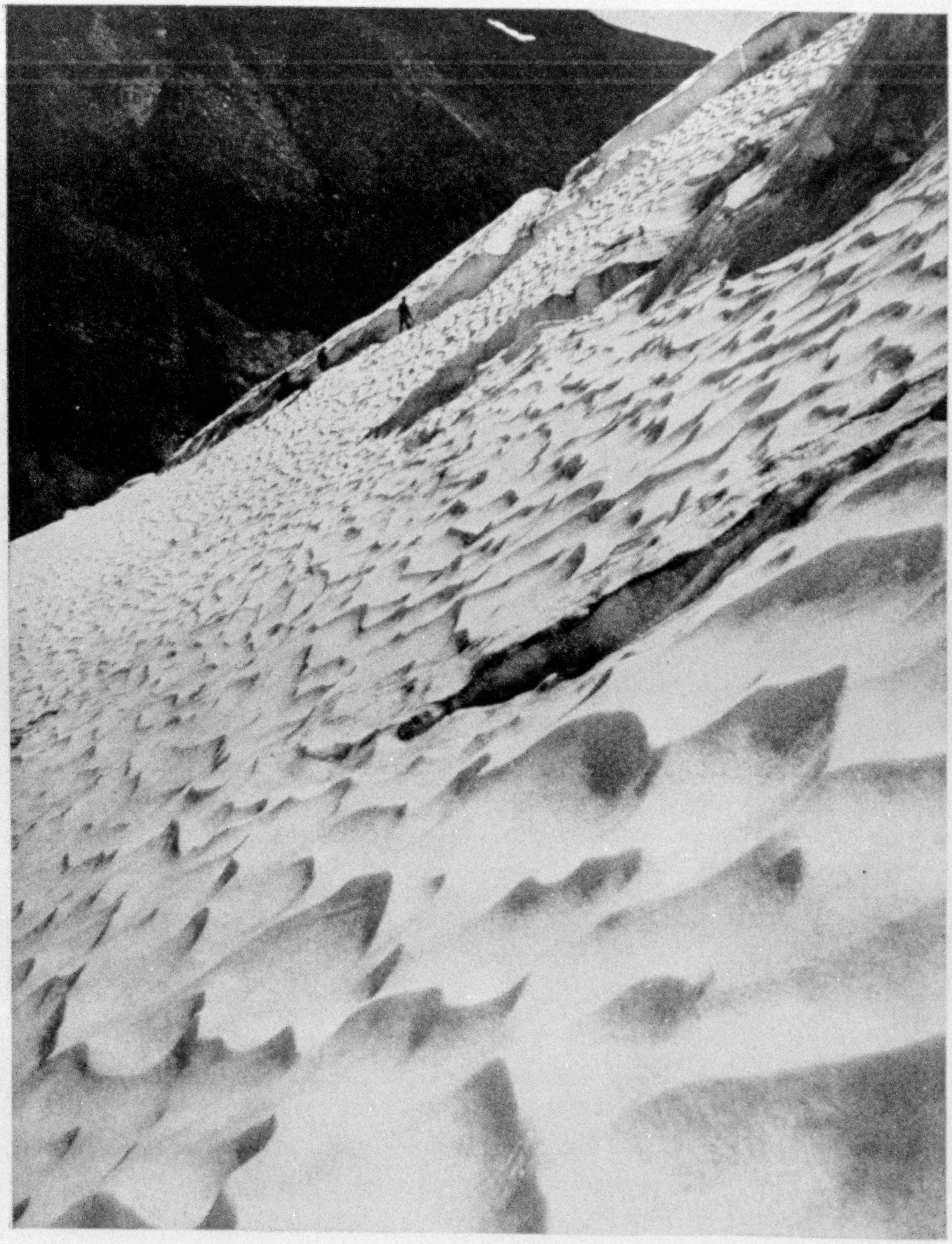


Photo by George M. Weister

ICE FIELDS ON THE WEST SLOPE OF MIDDLE SISTER

"On steep inclines the climbing-rope and ice-ax are essential to a reasonable degree of safety"

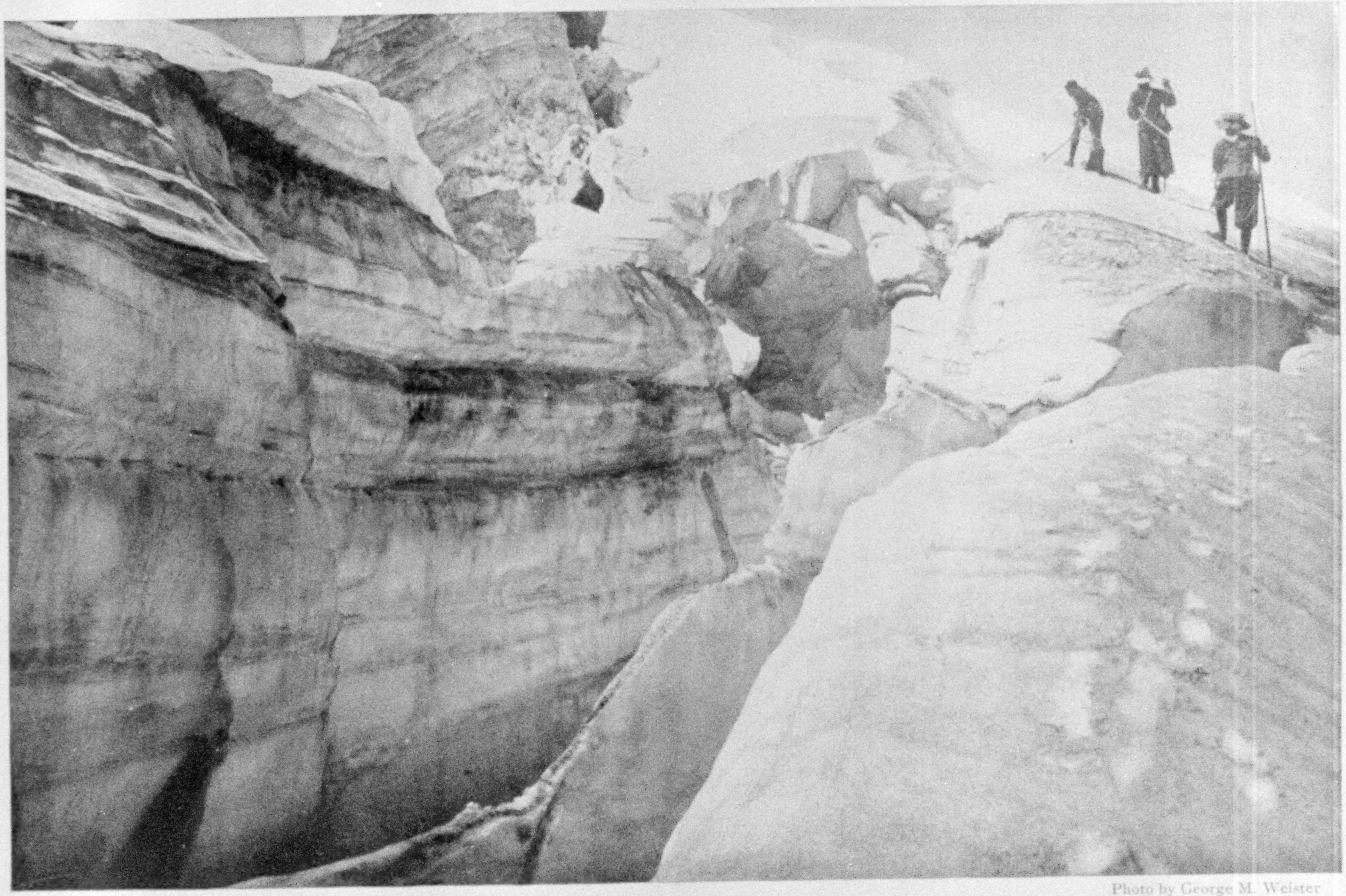
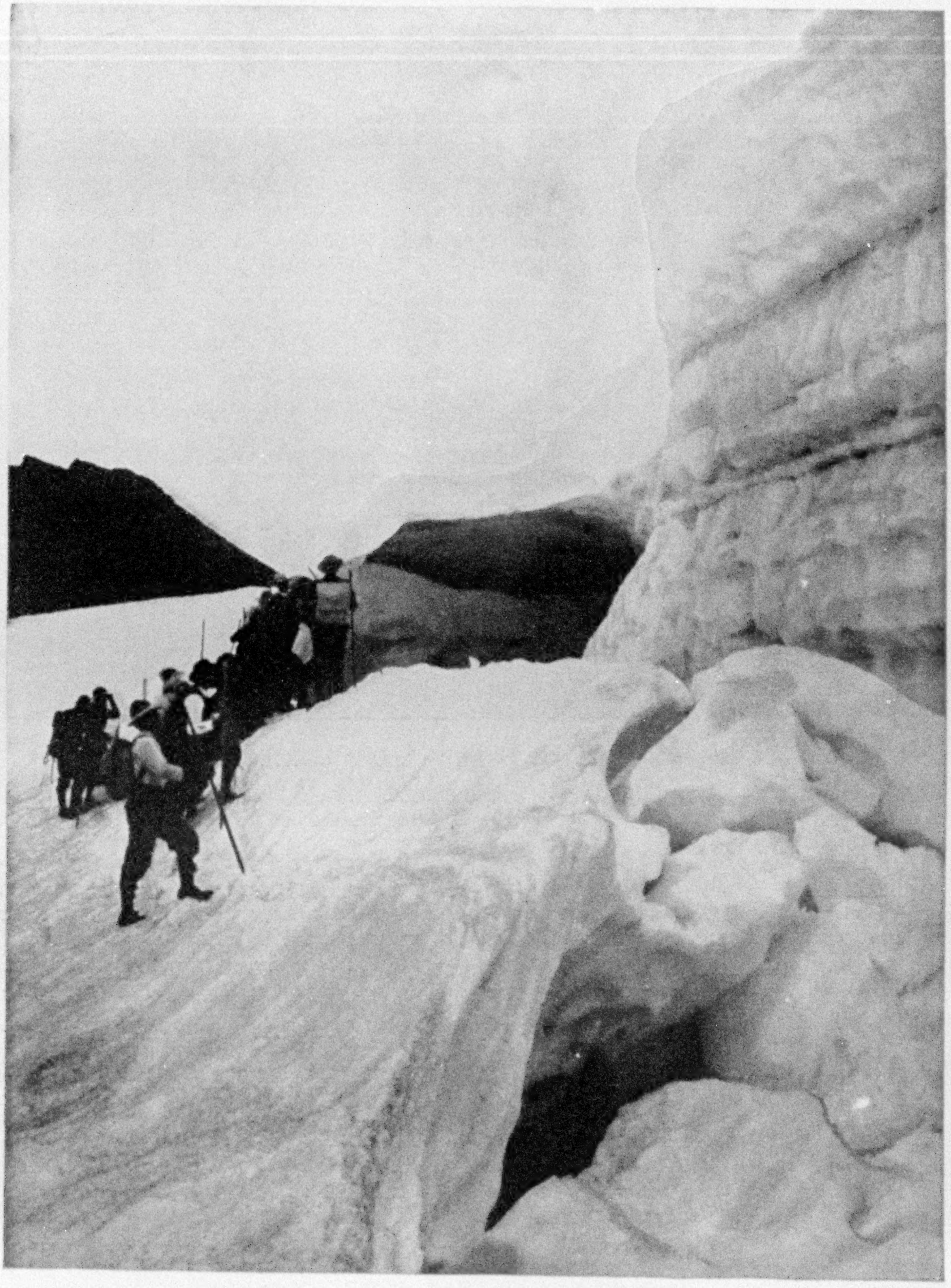


Photo by George M. Weister

GIANT CREVASSE IN THE COLLIER GLACIER

"Where the glacier proper starts down the steeper slopes, giant open cracks, called crevasses, are formed"



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GIANT CREVASSE AND ICE-WALL NEAR HEAD OF COLLIER GLACIER

"The lower wall drops down, leaving exposed a sheer ice-face on the upper side of the opening"

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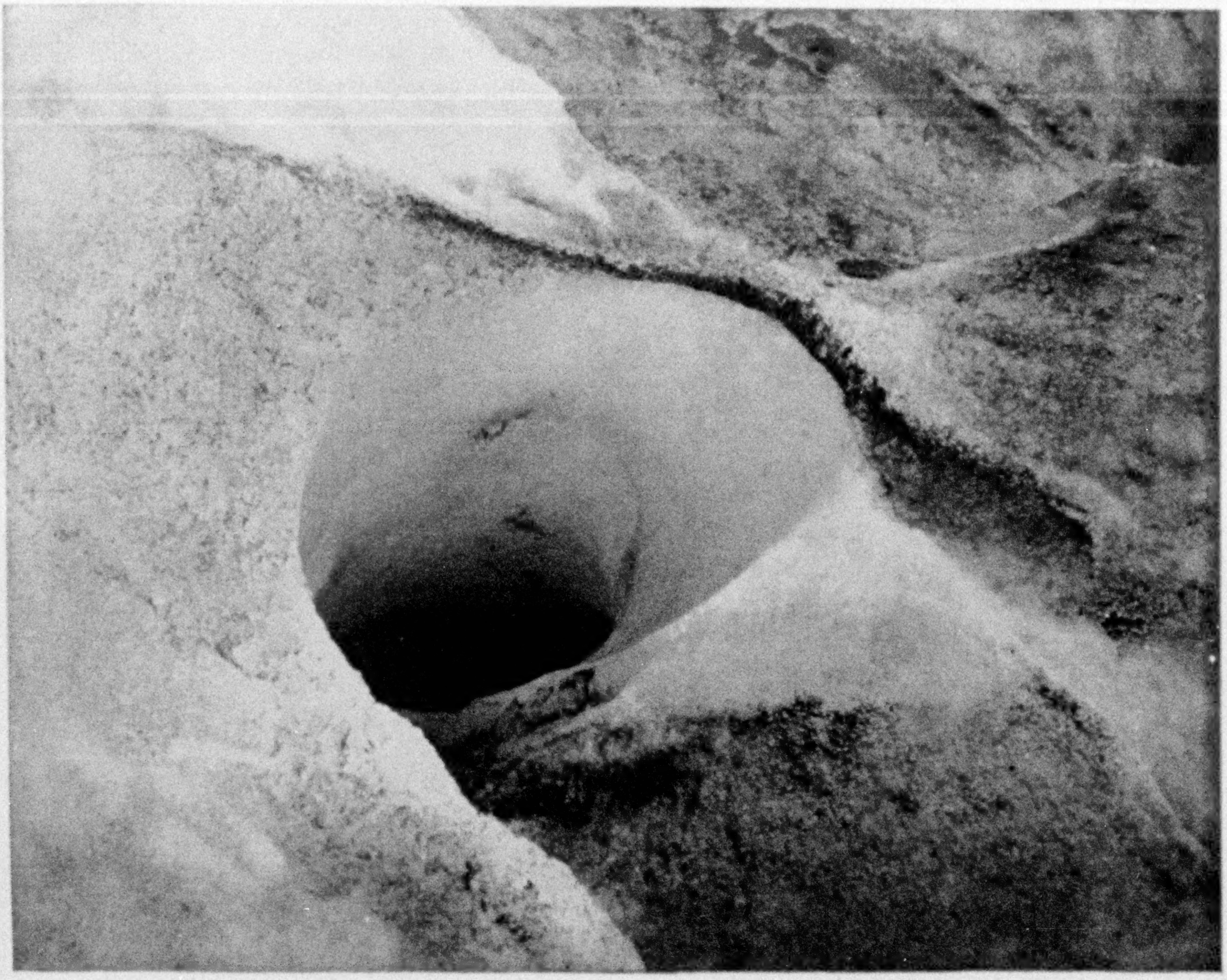


Photo by George M. Weister

AN ICE-WALL IN THE COLLIER GLACIER

"A circular opening into which the water plunges to unknown depths with a muffled, ominous roar"

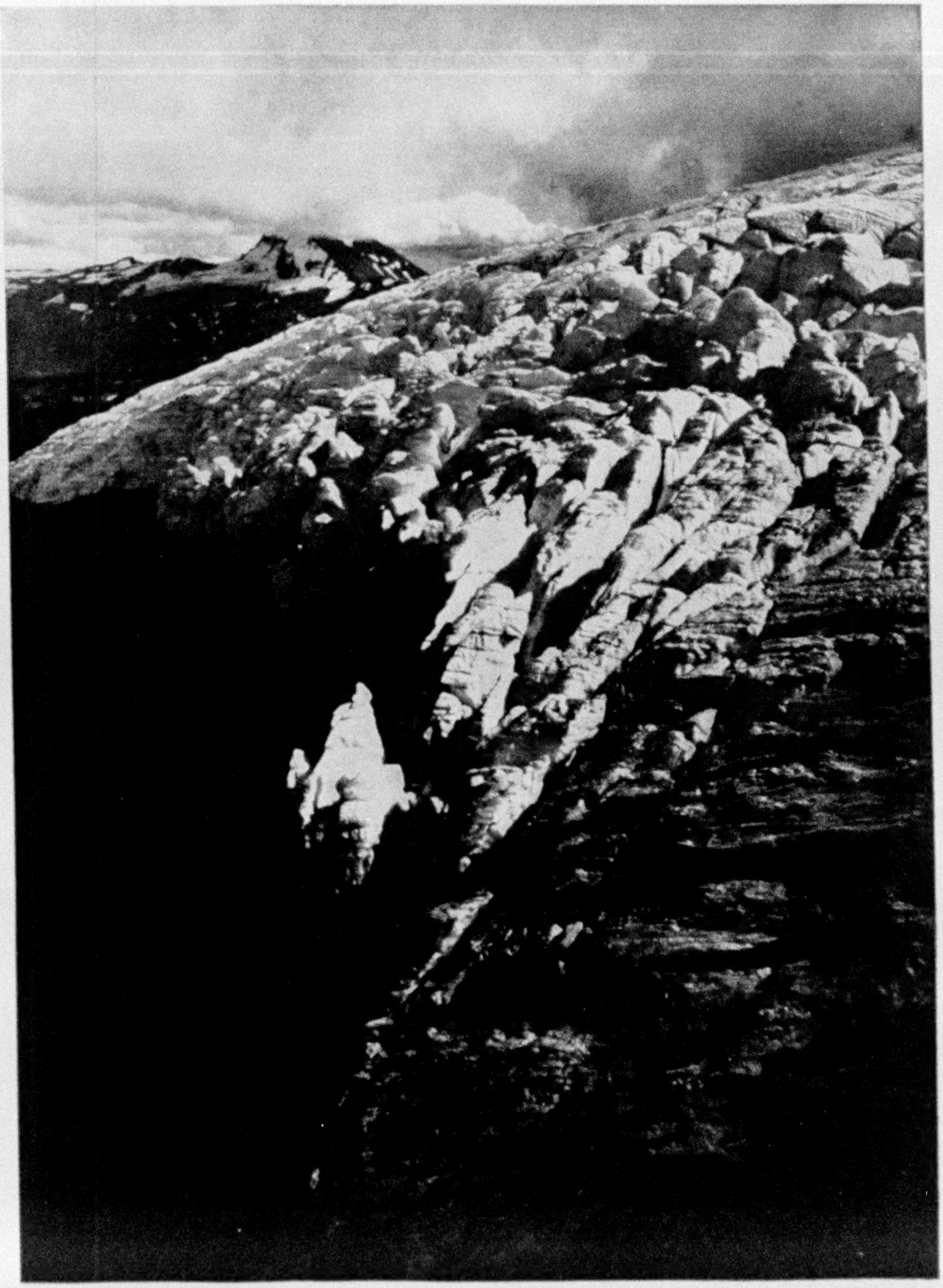
raines, heaps of glacier detritus far down the mountain side.

The Three Sisters are typical volcanic peaks. Only the south and middle peaks, however, have sufficiently resisted the destructive processes to exhibit the distinctive cone profile of the volcano, and South Sister alone possesses still a shallow crater in its top. North Sister is an elongated, jagged ridge of unstable lava, culminating in a massive pinnacle with almost vertical creviced sides, whose 100 feet of height had, until 1910, so far as is known, successfully daunted the enthusiasm of all aspirants but one, Mr. H. H. Prouty, of Portland, Oregon, who, unaided, made the ascent in August of that year. This same season a committee of the Mazamas succeeded, by means of ropes, in placing the official record-box on the apex of the peak.

The peaks themselves are composed of volcanic materials entirely, and the varieties of rock represented in their masses and covering large adjacent areas in every direction suggest a succession of eruptive periods, during different ones of which different rock species predominated.

In general keeping with the trend of the Cascade Range, volcanic outflow seems to have proceeded from vents along a series of fractures in the earth's crust running north and south. Evidence shows that these eruptions have taken place at intervals throughout the long lapse of geologic time, from the Tertiary period almost to the present.

The earlier lavas were prevailingly andesitic, while the more recent craters have discharged vast quantities of basalt and other markedly basic extrusives. Aside from the symmetrical outlines and crater of South Sister, additional evi-



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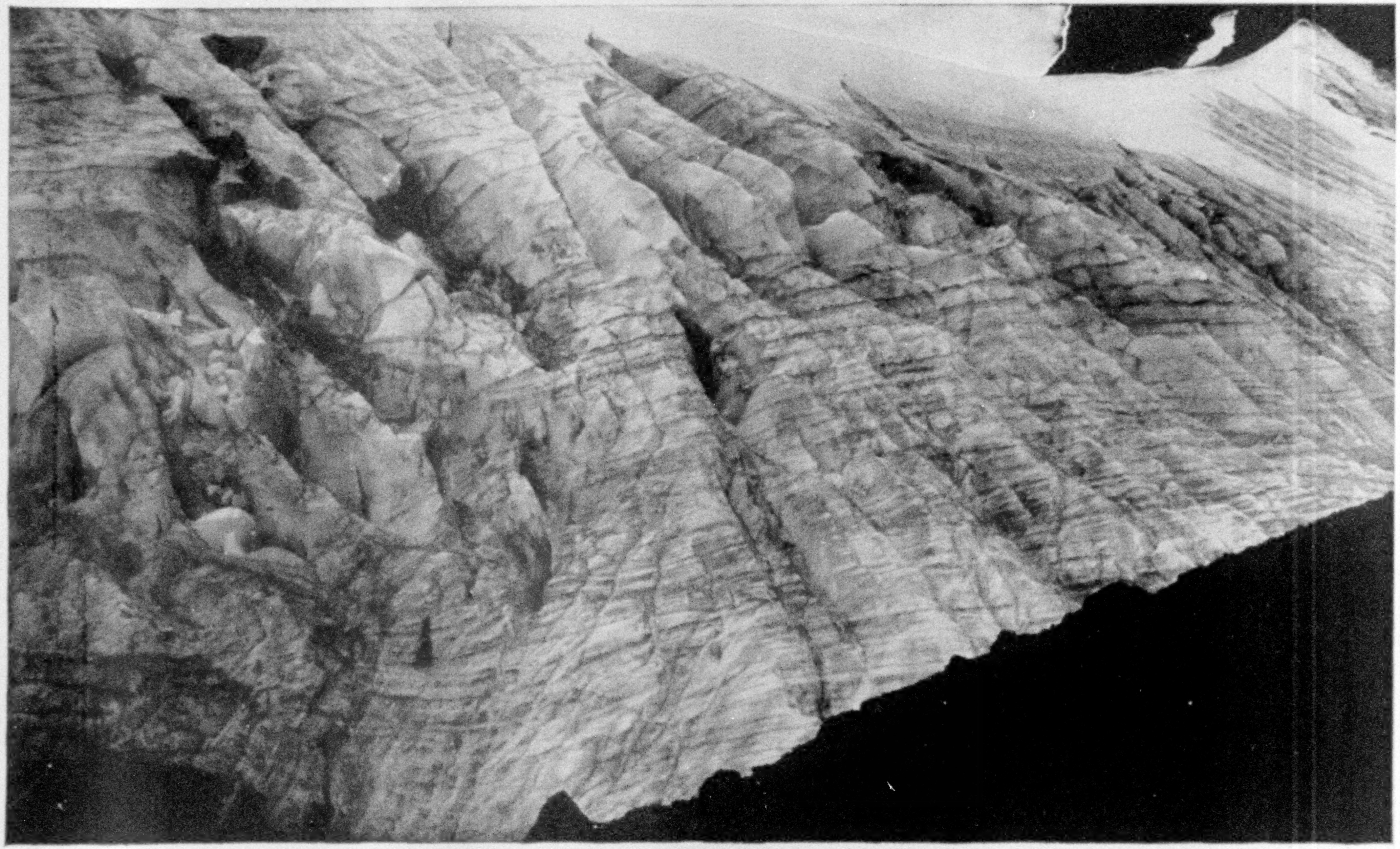
SERACS AND ICE CAVERN AT EDGE OF GLACIER: AN EXCEEDINGLY ROUGHENED SURFACE IMPOSSIBLE OF TRAVEL



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LATERAL VIEW OF HAYDEN GLACIER

Persons at lower left will afford measure of height. Note distinct bands in the solid ice. Vertical angular depressions may mark outcropping of former crevasses dence of the recency of volcanic activity is to be seen in the innumerable lesser, though more perfect, cones scattered up and down the range and the hundreds of square miles of barren scarcely traversible broken rock surfaces resulting from their outpourings.

Near by to the northward stand Black and Belknap craters, a bird's-eye view of which reveals clearly the manner of eruption, successive gigantic tongues and lobes of ropy, viscous, seething-hot lava spreading, like thick molasses, from an overflowing subterranean reservoir of supply. At times the eruptions were violent and the ejectamenta blown into the atmosphere in the shape of volcanic gravel, lapilli, and dust. Enormous quantities of such fragmental material have been scattered over the region. The so-called cinder cones are largely built in this way.

With the exception of North Sister, the ascent of the peaks is not difficult. South Sister is readily approached from the westward, a course taking advantage of the several snow slopes on the south of west side having been found most feasible. The summit of North Sister can be reached by following up the notched apex of the ridge from the south.

The entire structure of this mountain is in such a state of decay that all of its steeper slopes are occupied by unreliable slide-rock. These are being constantly replenished from the rapidly disintegrating ledges above, so that a secure footing or even trustworthy hand-holds are not among the certainties afforded him who essays the climb of North Sister peak.

For the average climber the ascent of Middle Sister from timber-line is a vigorous five hours' work. The early part of the climb is chiefly a clamber over rough boulder slopes, interspersed with long snow inclines, interest in which in climbing up is not to be compared with the exhilaration of tobogganing them on the way down.

At intervals one travels over fairly smooth areas of glass-like obsidian, dark, brilliantly reflecting surfaces, often striated or furrowed, or exhibiting the characteristic billowy *roches mouttonnées* produced by past glacial action.

Again, a detour is necessary to avoid steep faces or abrupt masses of beautifully columned basalt, individual specimens of which show a dense black matrix flecked with a plentiful scattering of bright green olivine grains, and less frequently of phenocrysts of plagioclase feldspar. Emerging promontories of porphyritic andesite of towering proportions, displaying conspicuous structural peculiarities, are also objects of interest.

These features all lend support to the fact that the process of eruption in the formation of Middle Sister was predominantly a quiet one. From an unknown number of breaks in her sides vast coulées of molten lava stiffly flowed down her slopes and deluged the surrounding country. The extensive work of the glaciers and the ceaseless action of the weathering agents have so far obscured the original course of events here that only the keen, interpretative eye of the geologist is able to decipher the mountain's life-history.

About a mile of the ascent of Middle Sister can be made over the ice and snow fields of the Renfrew Glacier. Its surface is not badly interrupted by crevasses, and rarely is it so steep as to render recourse necessary to more rigorous means than a safe, dependable alpenstock. The last 1,000 feet to the summit is again a clamber up an increasingly steep incline, covered for the most part with alternating loose slide-rock and coarse boulders of all shapes and dimensions. Over the latter hands and feet about divide honors in facilitating ascent.

The view from the top of Middle Sister is one of surpassing interest. To the westward the undulating forest green blends dimly, through the August haze, into the darkened outline of the distant Oregon Coast Range. Down the Cascade Range looms South Sister, with her guardian ramparts, the Husband and Broken Top, to the right and left respectively. Beyond, Diamond Peak is within the range of vision, and, somewhat bedimmed, Mount Thielsen, 75 miles away. At all angles to the westward the placid blue of nestling mountain lakes is a pleasing relief in the monotony of forest landscape (see page 584).

At one's very feet, to the east, repose Hayden and Diller glaciers, their glistening white not out of harmony with the verdant forest fringe, which in this direction is of less importance than to the west. Farther out, the geometric outlines of cultivated fields in the fertile valley of the Deschutes River are faintly discernible.

At the north, North Sister, Collier Glacier, and a deployed series of lesser volcanic craters are for the moment quite overshadowed by the transcendent array of magnificence against the northern horizon. In all the splendor of their frigid though summer garb appear Mount Washington, Three Fingered Jack, the glacier-scored snow pyramid of splendid Mount Jefferson, Mount Hood, 100 miles distant, and, in a favorably clear atmosphere, Mount Adams, 50 miles beyond Hood, in the State of Washington.

Fed by the snows which accumulate in a well-developed cirque at the northwest foot of Middle Sister, the Collier, in its mile and one-half of length, exhibits all the characteristics of a full-fledged Alpine glacier.

The Hayden and Diller glaciers at the east side likewise afford the student of glaciology most excellent opportunities to observe many features of glacial movement. Progress over their surfaces is easy or difficult, depending upon the slope of the different parts and the extent to which the ice has been fractured and crevassed by irregularities in the bed over which it flows.

As a rule the snow-fields at the head are comparatively level and passable. In the lower portions, where the deep snow has been largely compacted into solid ice, however, the variations in the rocky surface on which they lie often produce breaks that appear at the surface as partially covered ice-bound clefts or wide-open fissures, travel across which is either dangerous or impossible.

On steep inclines the climbing rope and ice-ax are essential to a reasonable degree of safety. Where the glacier proper starts down the steeper slope of the mountain, giant open cracks, called crevasses, are formed.

As the ice-stream slowly settles down the slope, the crevasses continuously formed above are in large part sealed again into firm ice. On the lower part of the glacier, however, where the bare ice is exposed free from snow, the surface is often deeply corrugated by what appear to be the accumulated remains of former open fissures. These are wide at times and their edges rounded by melting. Travel is difficult across such a surface, and possible only when footwear is properly equipped with ice-calks to prevent dangerous slipping.

The movement of a stream of glacial ice conforms in general to the laws of liquid flow. Contact with the sides and bottom of the channel retards movement, but ice, being a brittle solid where not under heavy pressure, gives evidence of this drag by the appearance on the glacier surface, and especially near its borders, of a network of joints or joint planes.

The motion of the ice and its exposure to active melting so exaggerates the presence of these intersecting lines of weakness as to develop exceedingly roughened surfaces impossible of travel. The roughly angular blocks that are thus marked out in the ice-mass are termed "seracs," and to the resulting pinnacled surface the same name is applied.

During the day the effect of insolation is seen in the many streams of water, in size from the trickling rill to the torrent, running on the top of the glacier. Few of these streams proceed far before they drop into a crevasse or other opening in the ice. The repeated daily work of such a stream often forms an "ice-well," a circular opening into which the water plunges to unknown depths, with a muffled ominous roar, to add its volume no doubt to the main stream that issues from the ice-cave beneath the snout of the glacier.

The Three Sisters' region is not difficultly accessible, and affords on the whole unexcelled opportunities for the study of varied phases of volcanic action and of the movements, character, and work of glaciers. With it all, the chance to exercise one's mountain-climbing propensities is an item to be regarded as of first importance.

XUM

Photo by A. H. Barnes

COWSLIPS ON THE SLOPES OF MOUNT RAINIER (SEE PAGE 607)

THE GREAT WHITE MONARCH OF THE PACIFIC NORTHWEST

BY A. H. BARNES

AUTHOR OF "OUR GREATEST MOUNTAIN AND ALPINE WONDERS"

With Photographs by A. H. Barnes

MOUNT RAINIER is wonderfully associated with the far-famed Puget Sound. In company with the lesser peaks of the Cascade Range and Olympic Mountains further to the west, it stands as the great white monarch of the Pacific Northwest, the pride of Indian lore and myth. It overlooks the vast prairie empire of eastern Washington and westward the timbered region to the shore of the Washington coast, and in favorable weather is seen from considerable distance at sea.

It was less than two years ago that a prominent New York magazine published an article, wherein it was stated that the glaciers of Glacier National Park were the only living glaciers in the United States, when in fact the State of Washington contains six glacier-covered mountains, besides many detached sections of perpetual ice and snow regions among the Olympic and Cascade ranges not indicated by general maps. Mount Rainier alone probably has more bulk of glacier than the whole State of Montana, for it is estimated by our best geographic authority that Rainier radiates more volume and area of ice than any other one mountain in the world. The area of glacial surface is estimated at 52,000 acres.

Mount Rainier, "our greatest mountain," is the highest (?) and largest glacier-covered mountain in the United States. To the stranger in Puget Sound

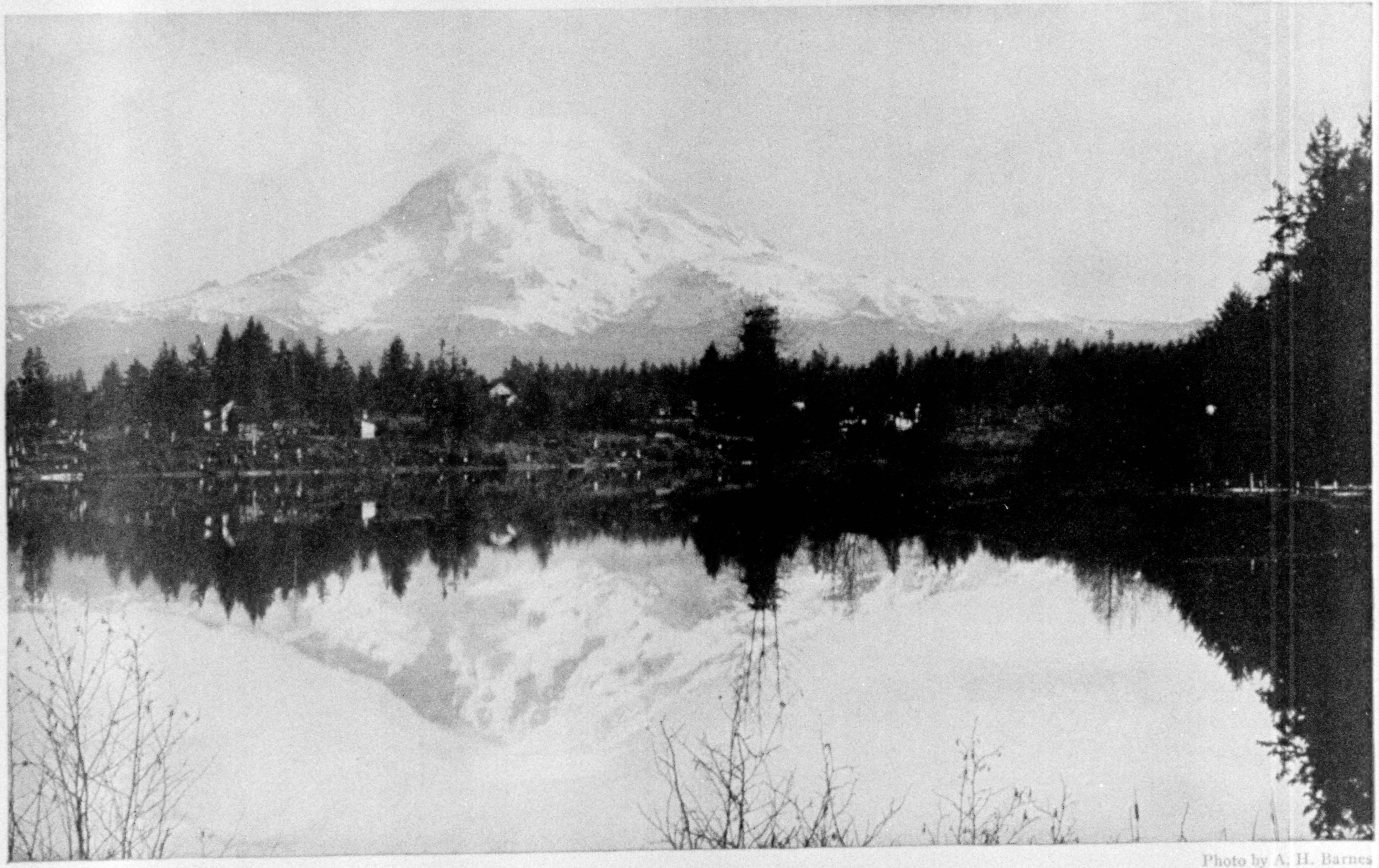
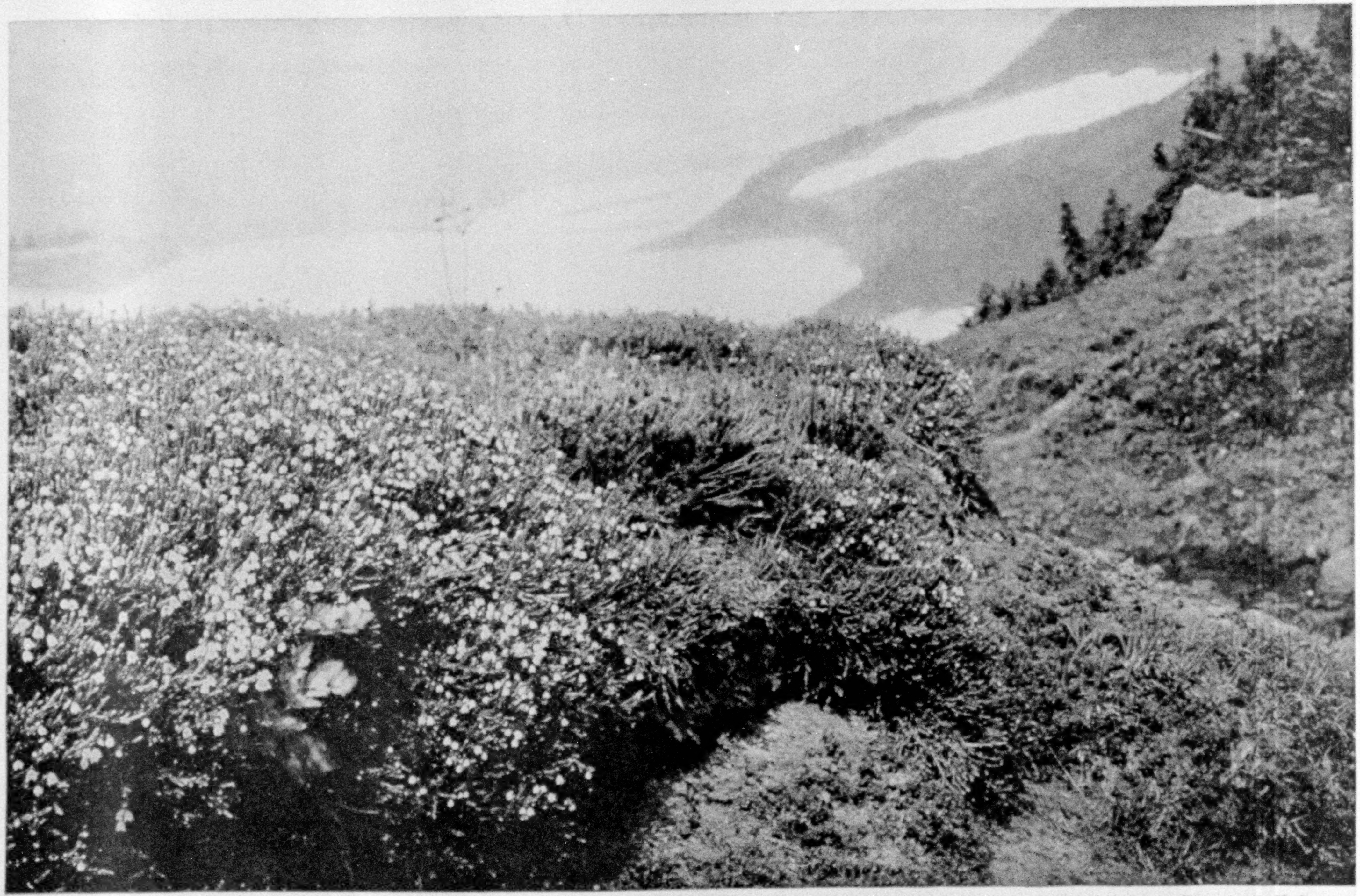


Photo by A. H. Barnes

VIEW OF MOUNT RAINIER FROM SPANAWAY LAKE, 40 MILES DISTANT, SHOWING STORM-CAPS (SEE PAGE 598)



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A BANK OF WHITE HEATHER AT TIMBER-LINE ON MOUNT RAINIER (SEE PAGE 607)

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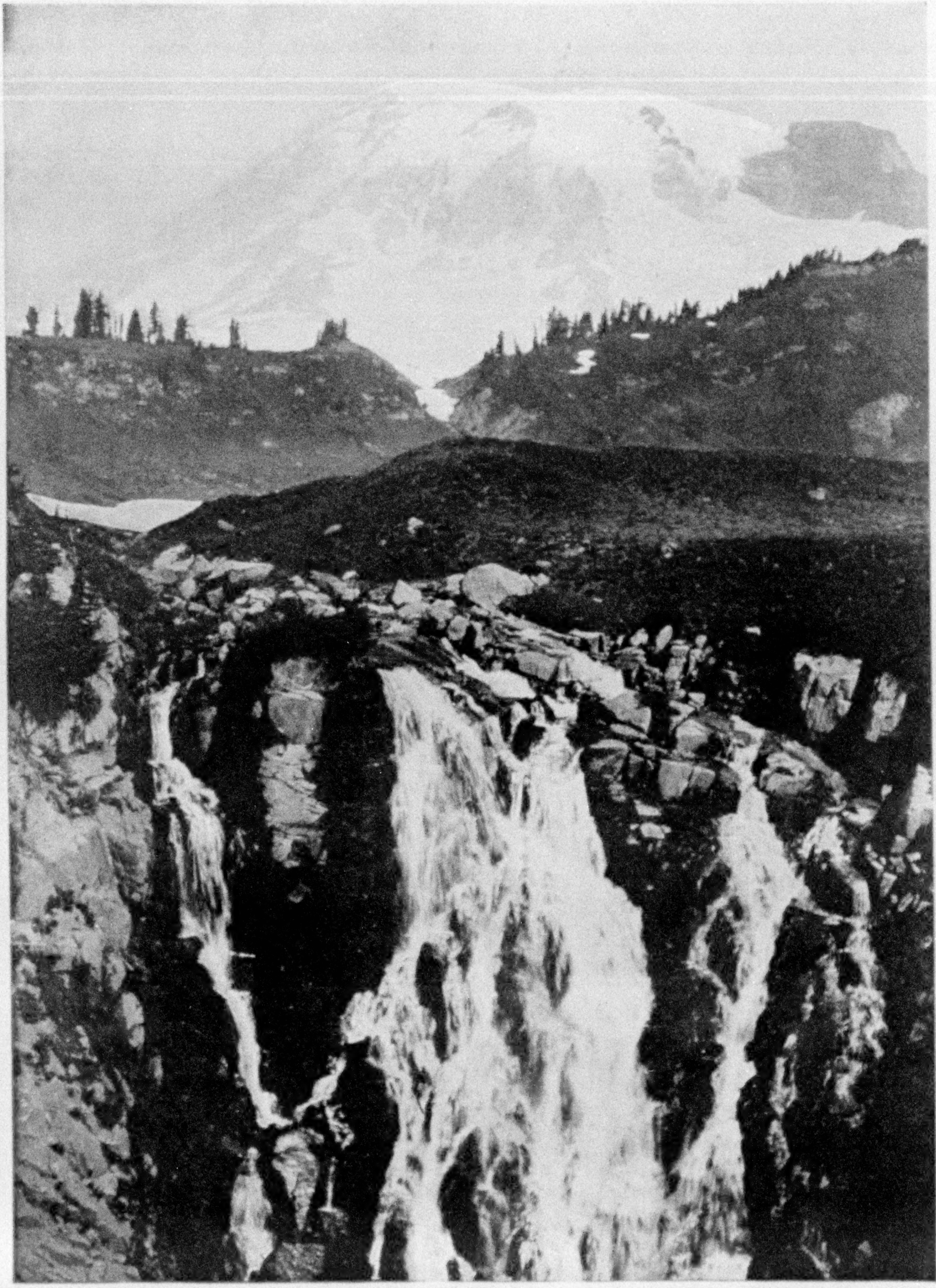

Photo by A. H. Barnes

A BRANCH STREAM OF UPPER PARADISE RIVER IN THE MORNING, SHOWING MOUNT RAINIER IN THE DISTANCE

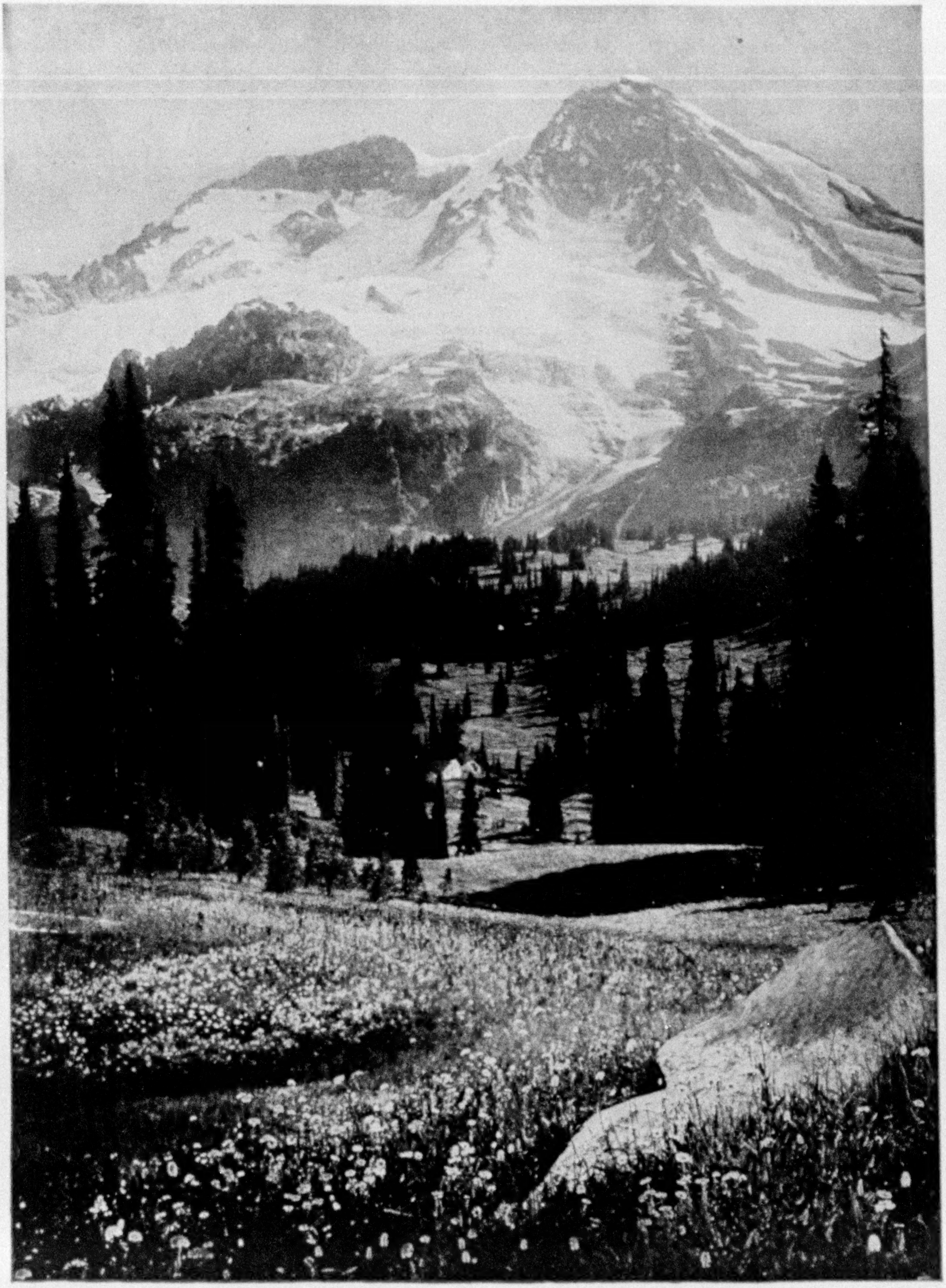

Photo by A. H. Barnes

GLACIERS OF THE SOUTHWEST SLOPE OF MOUNT RAINIER

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it appears to be less than 10 miles away, but on further inquiry the tourist learns that it is more than 40 miles distant, direct line from sea-level at Puget Sound, from where mountain survey measurements are made and all Rainier Park travel starts.

Studying it more in detail, he begins to comprehend its size and rugged anatomy. But the scene is beginning to change; the sun is low in the west; the lower end of the glaciers, white a few minutes ago, become a graded tint of rose pink; the blue has changed to a purple, but the summit is still white, for it is 7,000 feet higher than the snow-line and projects up into the white rays of the setting sun. The red rays are slowly moving up the mountain; the summit has changed to rose hue, the last coloring of day, which it holds for some minutes after the sun has left the landscape, and then changes back again finally from warm to the cold purple afterglow that generally precedes a summer night on Puget Sound. Many yards of canvas and photo film have been used on this distant subject, and even the best pictures but belittle the mountain's ever-changing grandeur and magnitude.

Viewing Mount Rainier after the weather has been fair for some days, it is common to see the summit covered with a cloud. This cap is very interesting and is always looked at for a forecast of a change of weather, especially when it forms immediately in contact with the summit, hugging down closely like an inverted saucer. When the cap forms suddenly, like the sudden drop of a barometer, the change of weather is not long coming. The cap does not always touch the mountain top, but is occasionally some distance above and holds its shape during a whole day or more.

From a far distance this cap appears to be a still cloud with no motion, but in studying it from close range one will observe that at the west edge the cap develops rapidly, dissolving to invisible condition at the east edge. Evidently it is a stationed point of condensation, but not a stationed accumulation of moisture. I have studied the philosophy of this cap at close range during 16 seasons' visits and never have seen a still or real calm condition on the mountain's summit at the time; there is always some wind and most generally a gale (p. 504).

Another caplike cloud often forms some distance to the northeast of the summit and considerably higher. What relation this one has to the mountain is much more difficult to explain. It is probably due to the condensation in an eddy or junction of wind currents that on their coarse come together some distance beyond the mountain top, which has disturbed the wind like an island divides a river into two streams that join again in one some distance beyond.

In places among the higher mountains on lee slopes, where snow is not disturbed by wind, the pack of one season's fall is sometimes 50 feet deep as late in the season as September. The snow garment of the mountains is their chief feature of attraction, for but few people would visit these piles of lava were it not for the great ice fields.

The crater of Rainier, concerning which many questions are asked, is not dangerous, but rather a life-preserver, and has been so used during storm. There are no openings within the crater large enough to be dangerous. The whole circle of 1,600 feet diameter is filled with fallen black lava and covered with a thick pack of snow the year round, except at the edges near the crater's rim, which are kept melted by continual warmth. The main crater was the mountain's principal vent of eruption, but there is one other place called the little crater; it and a few other spots near the top are also warm.

The first parties to the summit always made the crater their inn, where they stayed at night, warmed by the steam that issues from the small fissures just within the crater's rim; but of late the plan has been to reach the summit from Camp of the Clouds (elevation, 5,500), starting about 1 a. m., reaching the summit just after noon, and, after some hours' rest returning to camp the same evening.

In making a trip to the mountain's summit, August, 1911, the writer took along a thermometer to ascertain the steam temperature, and found the steam of the main crater in places to be about 150° F. There are other places where the heat is about boiling point.

Professor Flett boiled ice water in a tin cup over a steam jet in less than 10 minutes.

The steam is evidently snow water that seeps down to where it comes in contact with the internal heat, returning in vapor through the same general openings. It seems to contain no gas or fumes, and is of feeble force and little volume, soon disappearing in the high, dry atmosphere.

It is not seen from a far distance and is not a factor in producing the cloud cap that forms on the summit previous to storm. Some have advanced the theory that the steam makes the cap, but there is nothing in the study of the phenomenon to warrant it. Heavy barometer pressure would not force out an extra amount of steam (as some have expressed); it would tend to hold steam in; and, besides, the steam is of very small quantity. None of the summit visitors have ever seen a large volume of steam coming from the crater openings.

Publications stating that smoke and fire come from this volcano during seismic disturbance have no foundation of fact, for it is evident that no civilized man ever witnessed such a sight, and that volcanic action in this section is a phenomenon of the long past. People have been misled in seeing a cloud that appears like smoke, and hurry to announce their delusion.

Since 1870, when the first ascent was made, hundreds of people have stood on the summit of our great white "Templed Hill." A climb to the summit and return the same day is a long, wearisome undertaking, slightly dangerous, especially at one place rounding the upper part of Gibraltar rock (see page 600), from which there is an occasional shower of small pieces of rock that thaw loose from the snow patches above. So far as is known, there has been but one life lost in climbing the mountain, due to natural cause; the few others were lost owing to recklessness and lack of judgment. The crevasses are very bad if one gets into them, but they have generally been cleverly avoided.

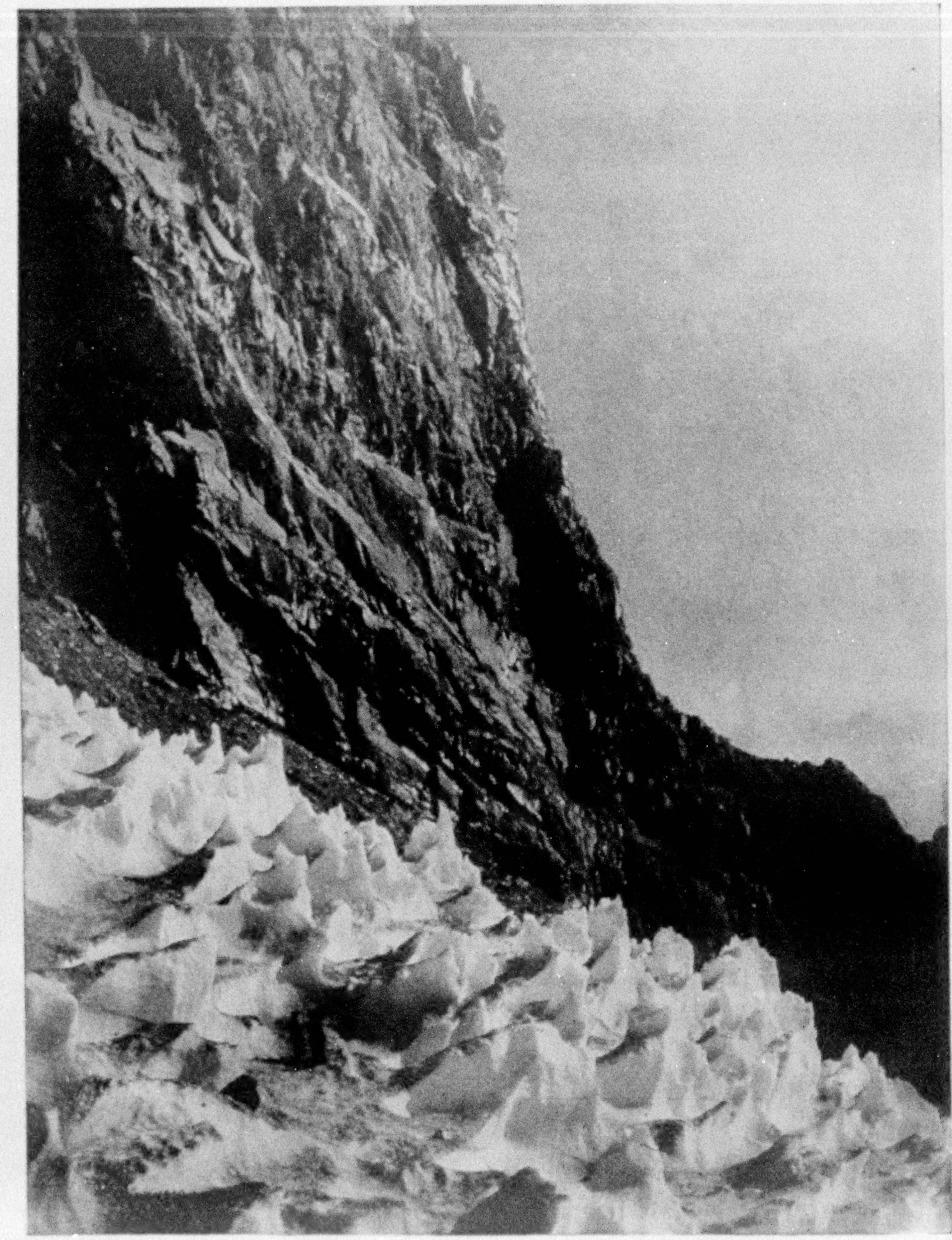
The chief official guide, who made 17 trips to the mountain top during one season, found the temperature near freezing point each time except on one occasion, when the warm belt of air extended to the mountain's summit, which is very unusual and in mid-summer only. The moisture of these coast mountains keeps it from seeming as rarefied as would be the same altitude in the Colorado Rockies.

From almost any close or distant position the glaciers are looked at so obliquely that one never fully comprehends their area as well as when making a climb to the summit. Patches of the glaciers are apparently very small from lower views, but when favorably seen from a near eminence become vast arctic fields carved by wind and sun into weird spires and domes.

Studying the crevasses and the actinic blue coloring they reflect will repay any one who has a day to devote to the climb. The higher up, the more curious are the carvings of the snow surfaces, which would indicate that the winds are the chief factor in making the peculiar whittlings.

This great pile of lava, heaped to an elevation of nearly 15,000 feet, is characterized by several features deserving of special individual study. The geologist, geographer, botanist, poet, painter, landscape gardener, and specialist all find a wealth of interest throughout this 324 square miles of reserve, besides much adjacent territory comparatively unexplored. Since the original stage and pony day travel has given place to railway and auto, the autoist finds a new territory, and now in the winter the skeer and snow-shoer are beginning to look toward the Rainier Park for their sports.

To a woods-dweller the timber is a matter of course, but to those who have not been amid large forests it is one of the very special features of the reserve and an educator in forestry of the best



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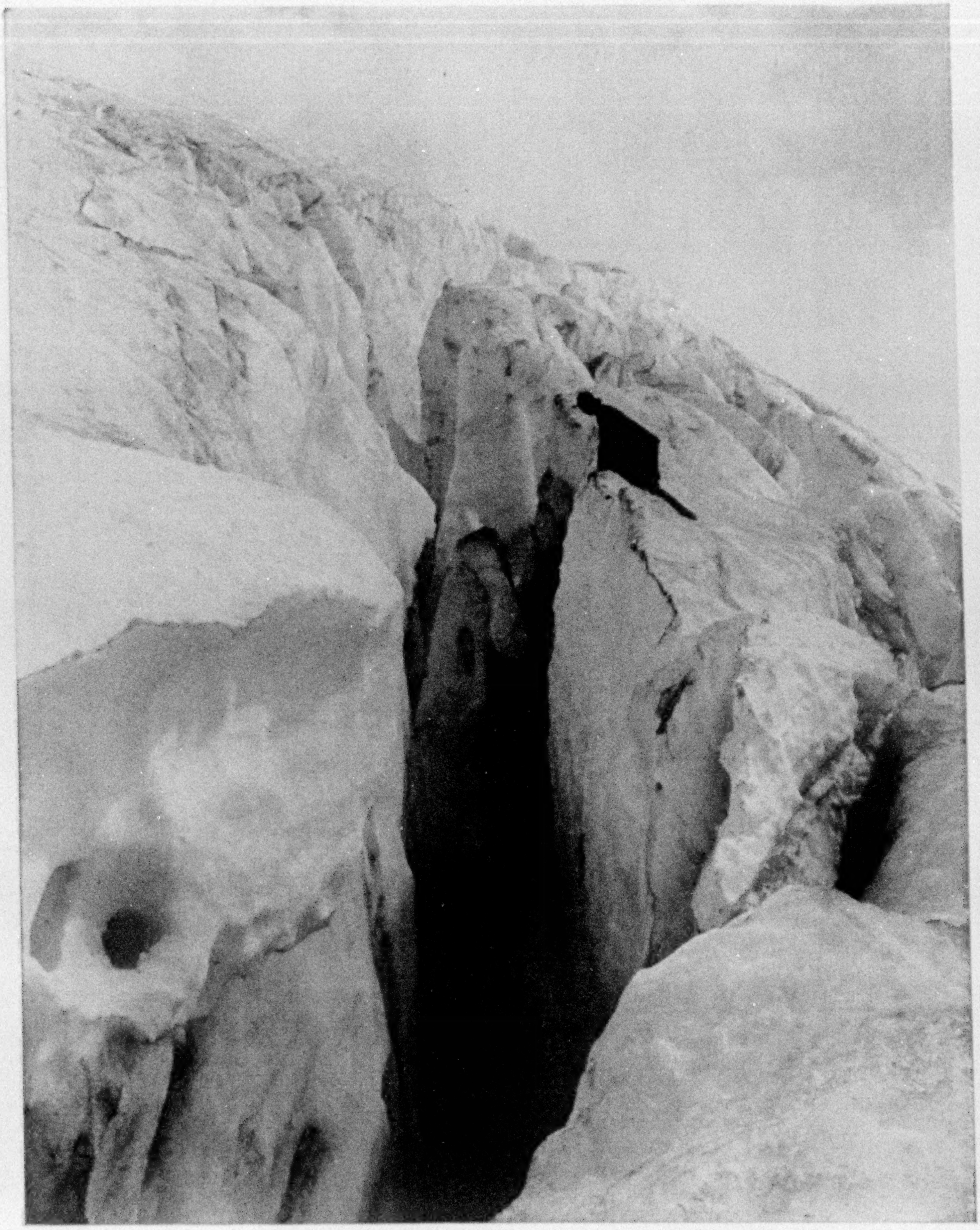
THE 1,200-FOOT WALL OF GIBRALTAR ROCK: MOUNT RAINIER (SEE PAGE 599)



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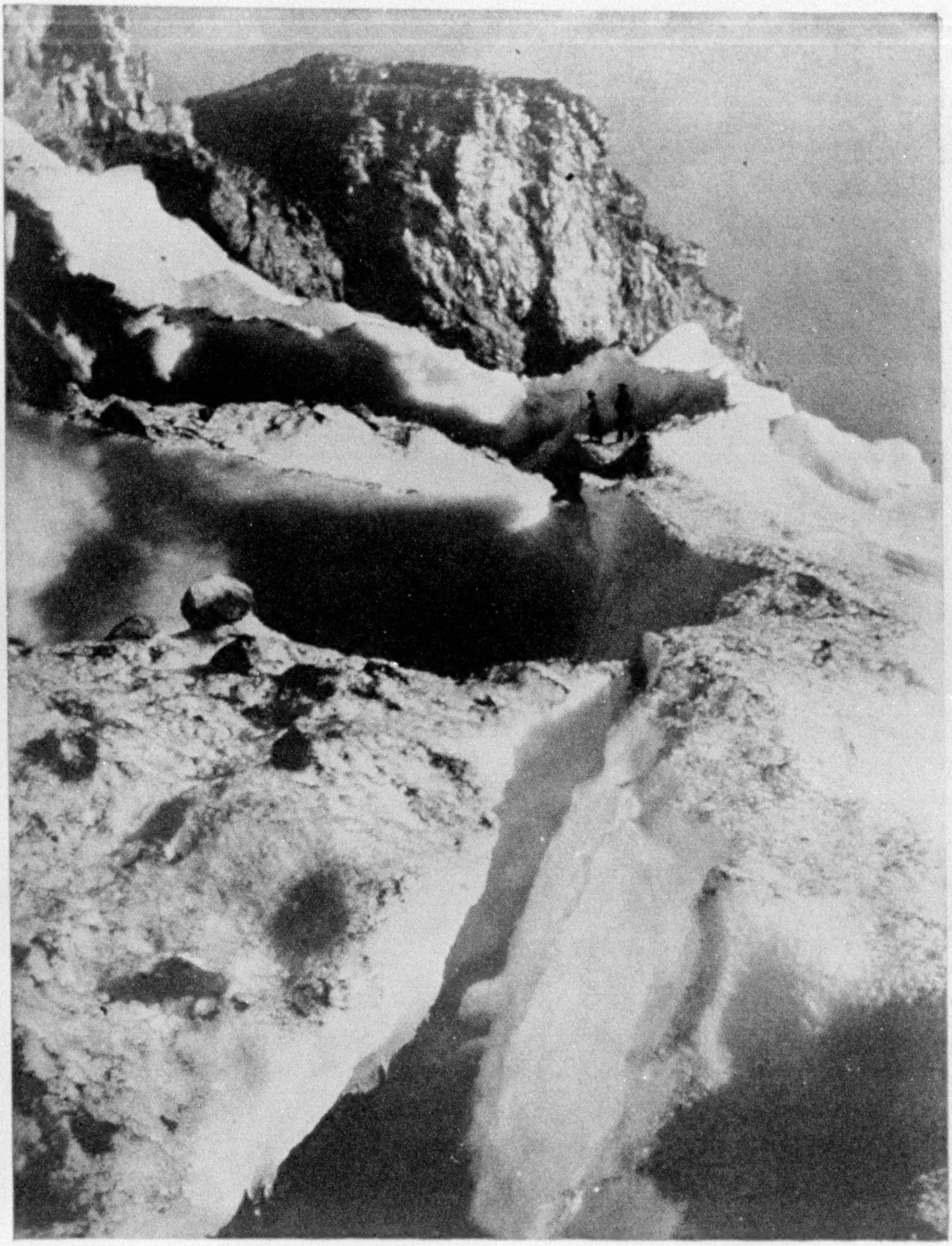
CREVASSE ON DIVIDE OF THE PARADISE AND LITTLE COWLITZ GLACIERS; MOUNT RAINIER



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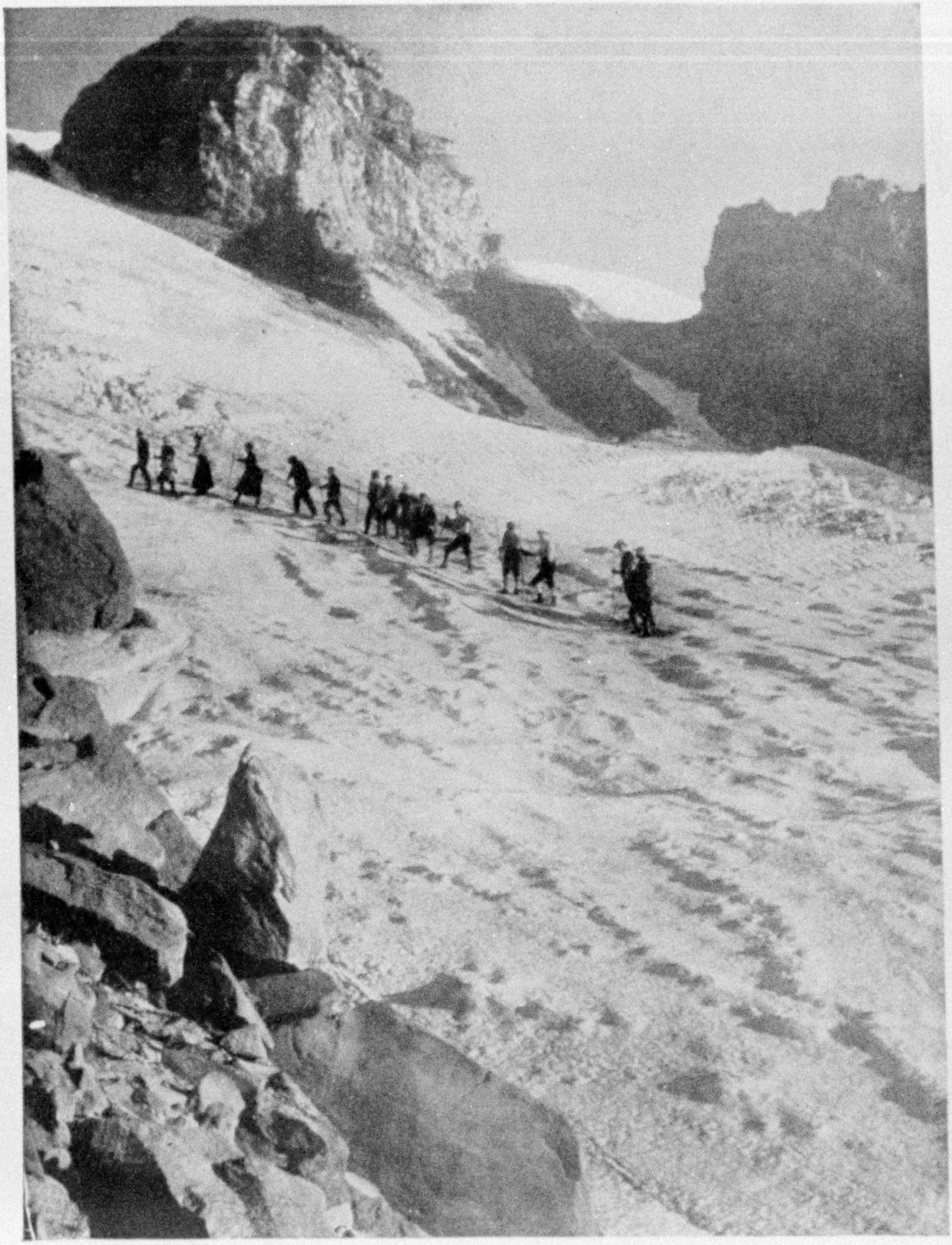
CAVERNS ALONG THE WAY, ABOVE CAMP MUIR, ON MOUNT RAINIER (SEE PAGE 599)



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A PARTY LEAVING CAMP MUIR IN THE EARLY MORNING FOR SUMMIT OF MOUNT RAINIER (SEE PAGE 599)

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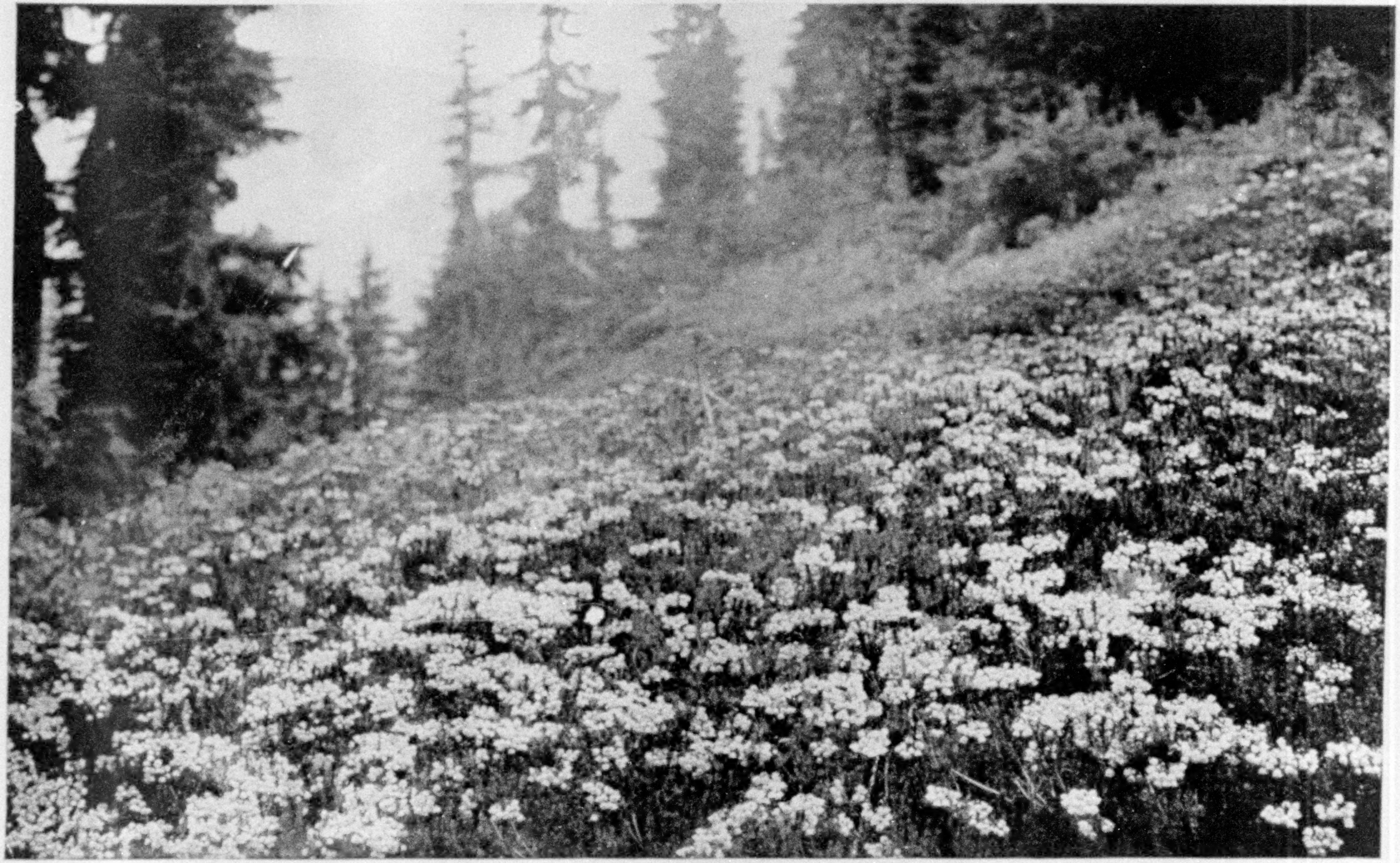

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A SLOPE OF ROSE-RED HEATHER ON MOUNT RAINIER (SEE PAGE 607)

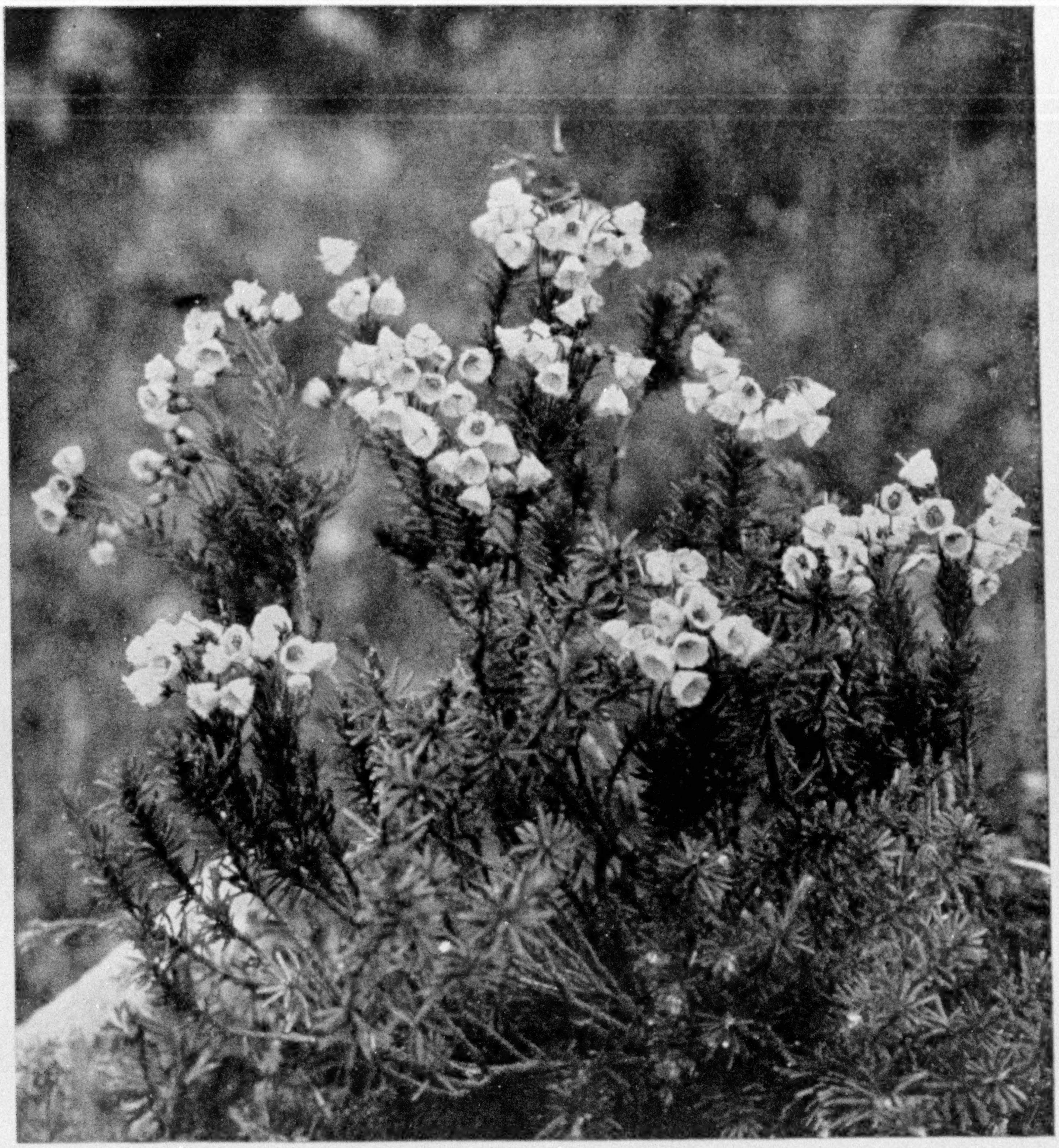

Photo by A. H. Barnes

A SPECIMEN OF ROSE-COLORED HEATHER ON MOUNT RAINIER (SEE PAGE 607)

kind. From the dense forests of the valleys and on the lower slopes, where trees grow to a height of over 300 feet, some with a diameter of 12 feet, the forester can trace the diminution of growth as the ascent is made to the scrubby brush-like trees at timber-line, struggling, as it were, for their existence.

To a landscape gardener the park is the best natural teacher. The promiscuous style in which nature has planted the shrubbery is ever a wonder. Where plant growth seems impossible, one finds the most thrifty flowers adorning a rock wall, on top of which grow clumps of alpine fir, hemlock, and Alaska cedar, dwarfed and miniatured by high altitude and lack of substance. Where seemingly no vegetation can live, they have been for generations rooted into the fissures of the high cliffs, eking out an existence on but a few bushels of soil.

The unvisited portions of the Rainier Park without doubt contain, yet unseen,

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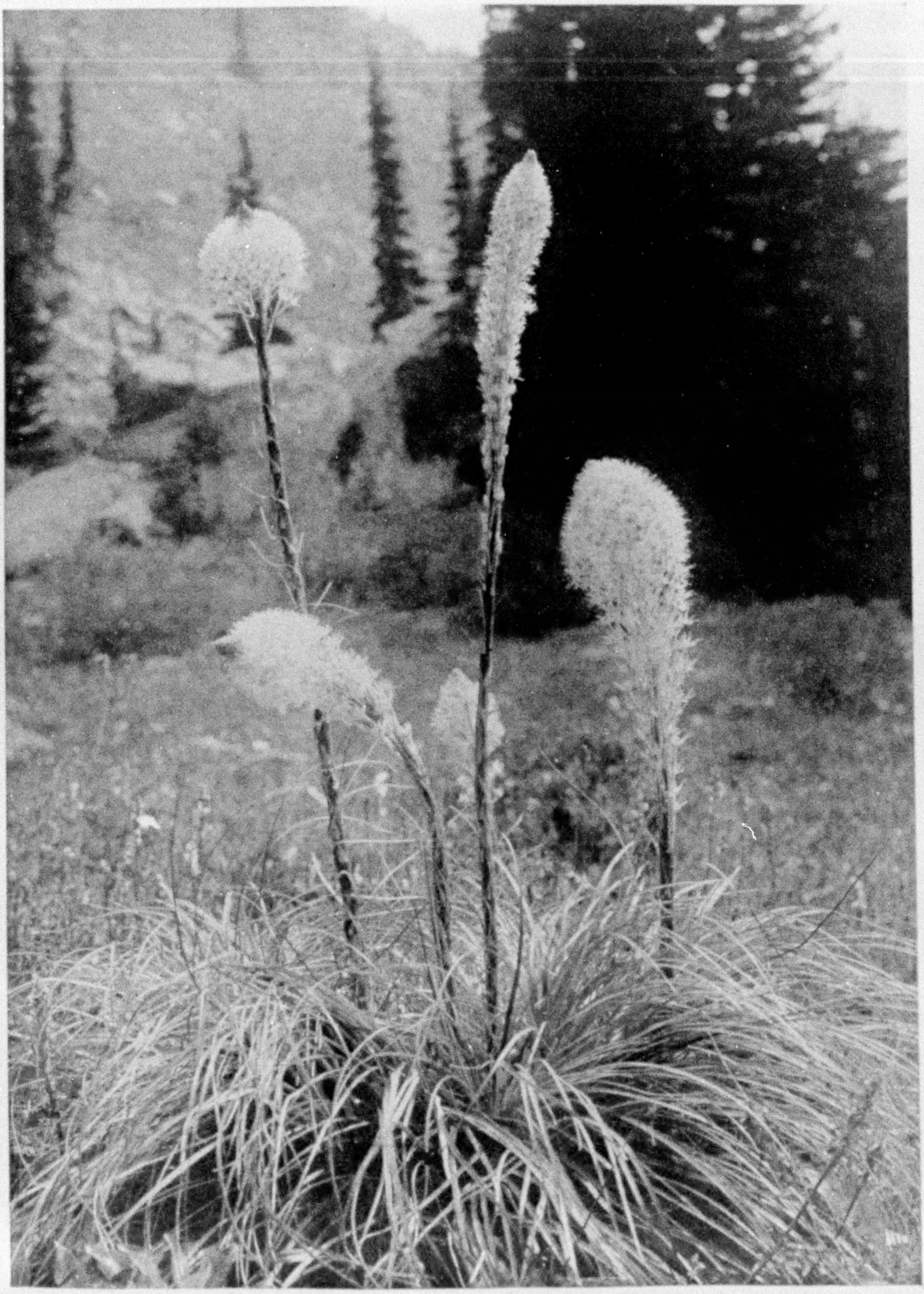

Photo by A. H. Barnes

BASKET-GRASS FLOWER ON MOUNT RAINIER (SEE PAGE 608)

XUM

such features as hot and cold springs, falls, small lakes, and botanical rarities. High on the ridges and slopes of the neglected corners of the park the wild goats make their home. Sometimes they have been seen in numbers of 30 or more together. The deer, which are more abundant than any other of the large game, are occasionally seen from along the Government road. The black and brown bear are also seen, and at rare intervals the stealthy cougar or puma.

The tourist season is generally from June to the last of September, and sometimes after the first snows of autumn have melted favorable weather is prolonged to November. In staying through the whole season the visitor will experience a gradual change from the early summer, green with flowers and melting snow banks, to rich coloring in the leaf foliage of autumn, enveloped in hazy atmosphere of purple gray.

Between 5,000 and 8,000 feet elevation the botanist finds Rainier Park his paradise, wherein there have already been found over 250 varieties of plant life, a dozen or more kinds belonging to this region alone. The majority of the flowers are of light tint, but there are a liberal quantity of blue, red, and yellow, so deep and pure of color that artificial pigments fail to imitate them. The distribution of several species of heather is a technical touch of finish in the evergreen, tipped in summer with clusters of small bells in colors purple, pink, yellow, and white.

The white heather—*Cassiope mertensianna*—though not so abundant as the red, because of its winsome, delicate, pure white bells, with red sepals and fine stems, delicately attached to its fine evergreen foliage, is the general favorite of the heather kinds (see page 607). This species also grows the highest, being sometimes found at 8,000 feet altitude. While the shrub is hardy, the flowers do not appear until some days after snow is gone and last but a short season. This heather is also the choice of the Scotchman, being nearer in style of flower and foliage to his native heather than the other forms here found.

The red heather, by some people called purple, more accurately speaking is deep pink of purple tint. Its growth is abundant between 5,000 and 6,000 feet elevation (see pages 604-5). Its thick clusters of bell-like flowers display pleasing contrast to the rich green landscape. The sepals and stems of this bell have a very unusual color, being of a light sienna brown. The pollen at one stage is dark gray, another singular feature. The heathers are favorites with the bees.

The cowslips — *Caltha leptosepala* — like several of the mountain flora, is scarce, especially in some localities, and not seen much by the vacationist in general (see page 593). Growing mostly in wet places and now and again partly covered with overflow from a near-by torrent, this flower appears to the casual tourist as belonging to the water-lily kind, but it is not so classed by the botanist. The flowers are medium size, with petals of dull yellow, almost white, harmonizing well with its stamens of deep yellow. This plant is very hardy to cold and moisture and comes early, ending its season before some of the late flowers have made their appearance.

The mountain meadow aster—*pulchellus*—not noted for its great abundance over a large area, is thrifty and plentiful in patches in moist flats where grass is thin (see pages 614-615). Its intense golden yellow center, encircled with a liberal number of light-purple petals, is its special feature. The short stems are greenish and graded to dull dark purple and wine color. It has seldom more than one head. The perfume is very mild and pleasing. The flowers are sensitive to cold, moisture, and darkness, with great tendency to close after the heat of day.

Anemones of luxuriant growth come early, and sometimes force their way through the edges of lingering snow beds. The blossoms appear first, but their carroty-like foliage is out in full fledge by the time the flowers are fully developed. The flowers are about two inches across, of a dull cream gray tint, nearly white, grading to dull purple hue near the lower ends of the petals as they grow older. The centers are full of long yellow stamens.

The anemone is especially deficient in perfume, a common failure with the mountain flora. Though the plant ends its blossom season early, its seed pods are covered with a spectacular flume of light brownish gray that attracts attention to the end of summer (see pages 612 and 613).

Mountain rhododendron—*Albiflorum.* How flowers derive common names is not always traceable; the mountain people took to calling this the snow brush. Its waxy one-petal bell flowers of cream white, about three-quarters of an inch wide, are very delicately fastened close to the stock, tucked away under its canopy of glossy light green leaves. Flowers are easily shattered from the stock, but for further protection nature seems to have planted this shrub generally in the shelter of other woods. The stamens and pistels are of same tint as the petal; the odor is slightly unpleasant. This plant deserves much attention as a flowering bush (see page 610).

Basket grass flower, or mountain lily—*Xerophyllum tenax.* The Indians dig up this plant, bleach its long fibrous leaves, dry them and weave them into small baskets, cups, and ornaments. Some people call it squaw grass. At 4,000 feet altitude, scattered over thickly wooden slopes, this evergreen bunch grasslike plant grows most thrifty. After several years a number of stocks shoot up from one set of bulbs; after then the plant rests a few seasons.

In the more abundant places the stock grows three to four feet tall, covered with its hundreds of tubelike flowers of waxy cream tint, almost white. This is the most spectacular flower of the mountain. It grows prettiest at an altitude of over 5,000 feet, where it has shorter stem and better form, but is very scarce. The stock then assumes a wine-color tint on sunny side. On close examination as well as at a distance, this plant is always a winner (see pages 606 and 609).

Gentian—*Gentiana calycoso.* If there is a favorite blue flower in the Rainier Park, it is the gentian—blue, blue, blue. It comes to full bloom about the last of August. It is not of great abundance, but is a plenty, and often puts forth 15 to 20 flower stocks in one bunch. The stems are about eight inches long, but like all plants it varies in size according to surrounding conditions.

The color is light cobalt at the top ends, the petal grading to deep purple blue toward the stems, which are often green, but usually of a dark wine color. The ends of the green leaves are also tinted the same as the stem, completing a scheme of wonderful color harmony. Partly hidden by other herbage, this flower is not conspicuous and sleeps late, opening in full only during the heat and light of day, but its season lingers on through the first light frosts.

Castellira areopala. Indian pink paintbrush, painted cup, are the common names of this wonderful, showy plant. While its perfume is scarcely noticeable, it is undoubtedly the most conspicuous of the park flora. Abundantly scattered over the meadows and slopes in separate clusters and thick patches, this species, in its deep magenta red, displays wonderful contrast to the rich greens. It varies some in lighter tints of the same pigment; some flowers are of scarlet, and rarely is seen a freak nearly white. The flowers flash into full bloom all about the same time and hold out fairly well to the middle of August. It appears best at short distance and coarse on close examination, but with nearly every one this flower lists with the favorites.

The few flowers described are but a mere introduction to the subject. Nature was bountiful and gave Rainier Park many kinds and colors. The avalanche or deer-tongue lily—*Erythronium montanum*—ranks among the best and most showy (see pages 616-617). It comes very early and in abundance. Following its season comes the light rose-colored mimulus, growing always close along the ice-cold streams.

The delicately scented valerian, scattered over knoll and slope, can be seen for some distance. The heads, on stalks two feet or more in length, are made up of many flowers of pure white (see page 611). The mountain phlox, grow-

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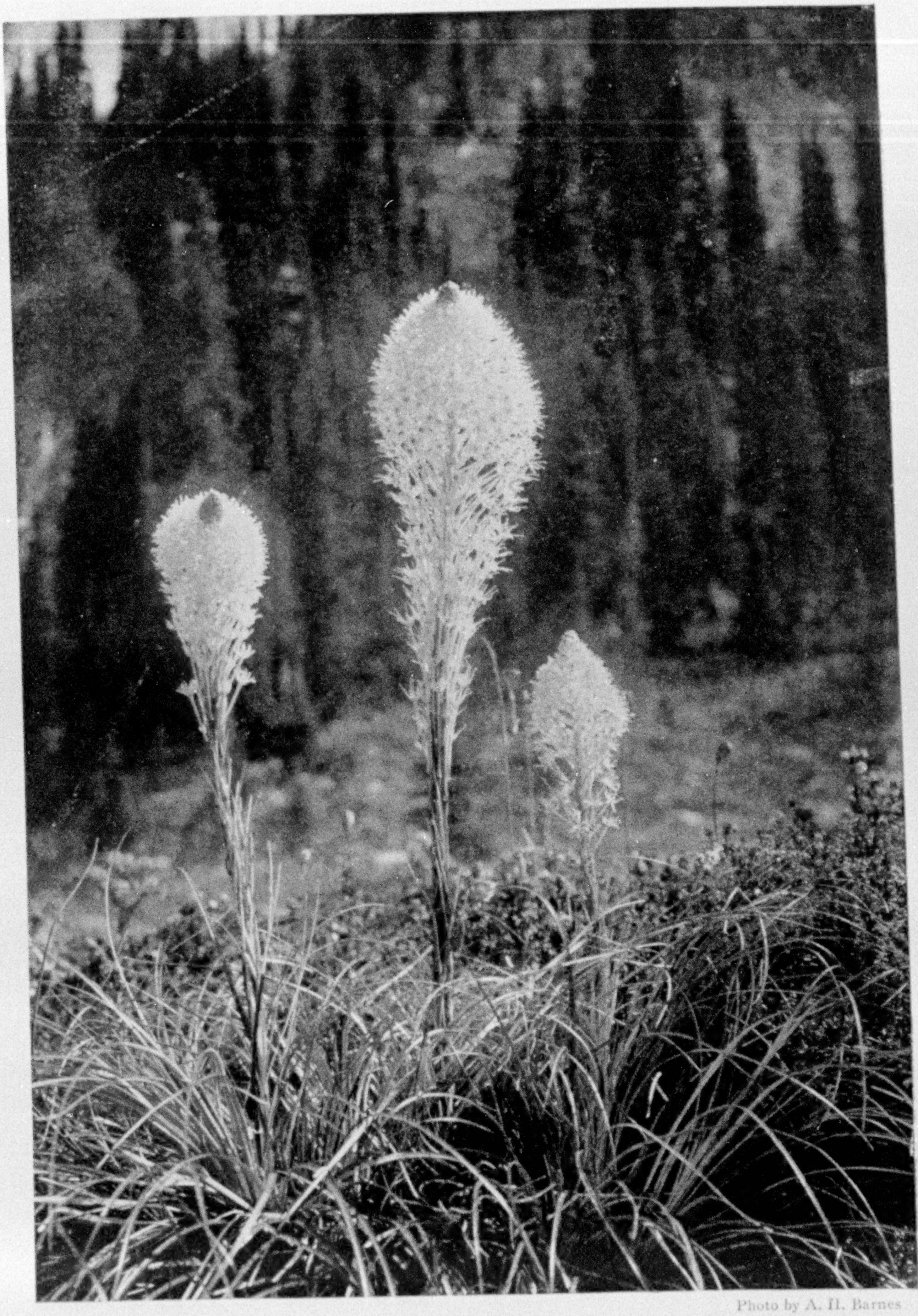

Photo by A. H. Barnes

ANOTHER CLUMP OF THE BASKET-GRASS (SEE PAGE 608)

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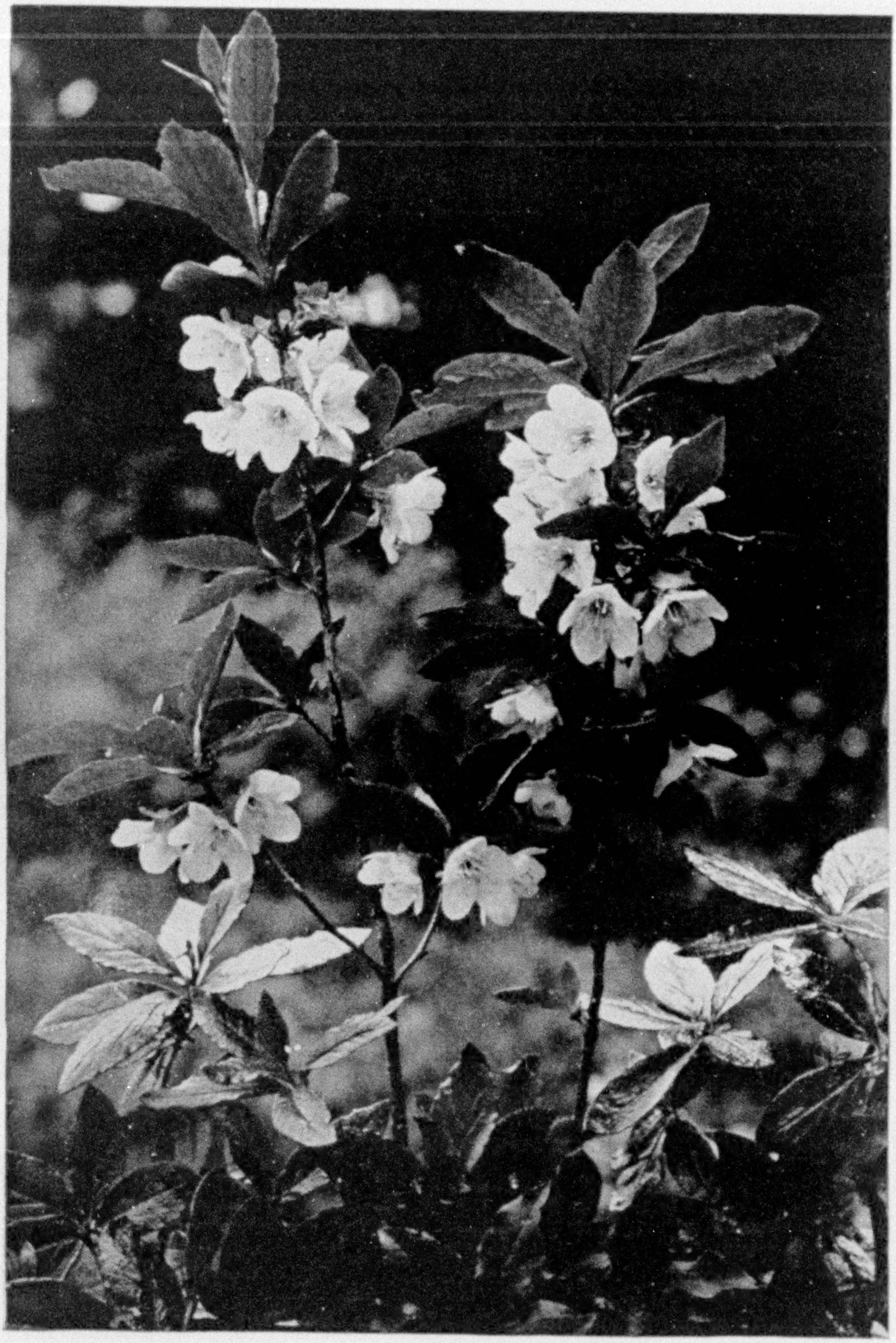
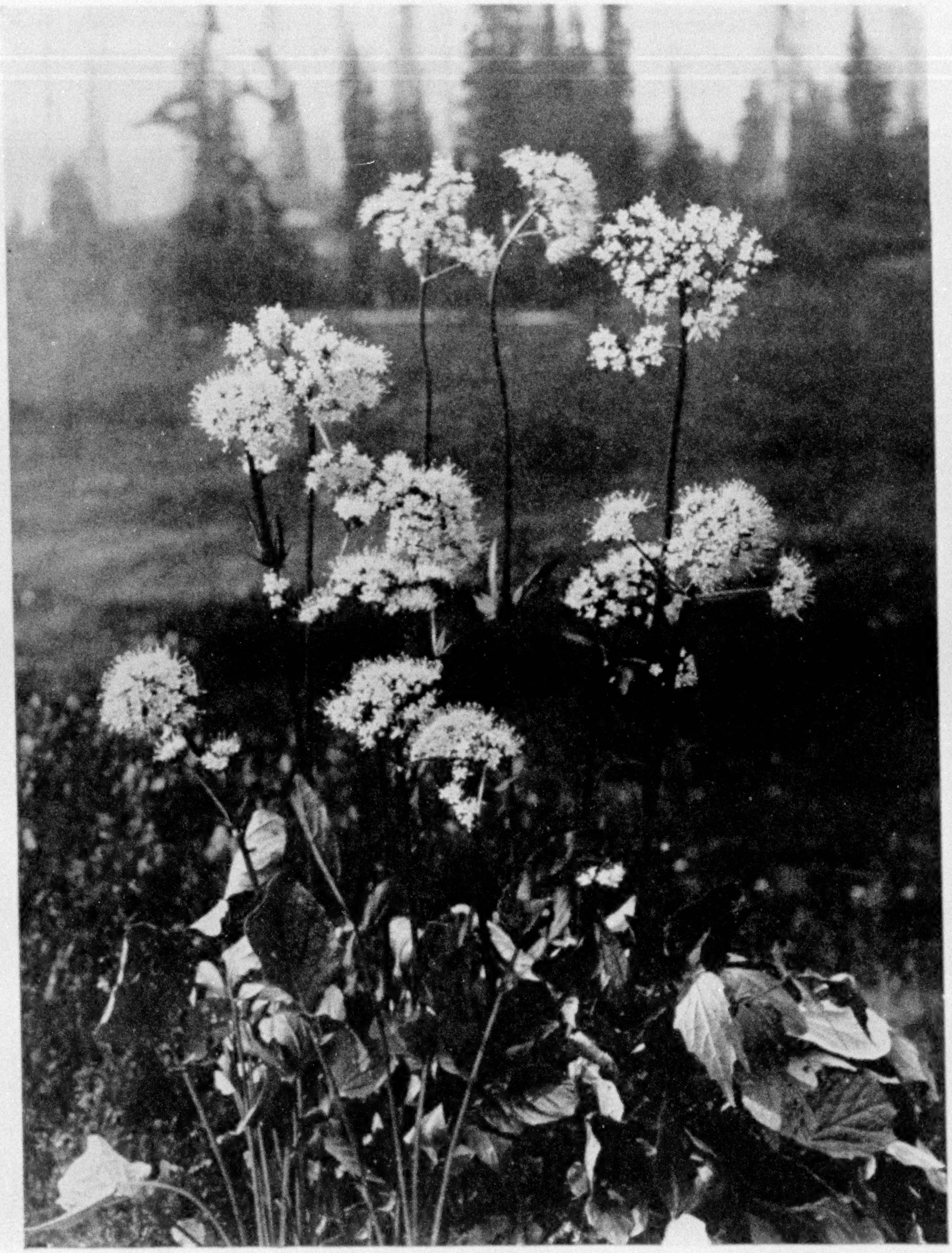


Photo by A. H. Barnes

SNOW-BRUSH, OR MOUNTAIN RHODODENDRON *(Rhododendron albiflorum)* ON MOUNT RAINIER

A bush flower that grows in company with other woods. Flowers pale lemon, cream, nearly white (see page 608)



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VALERIAN ON MOUNT RAINIER (SEE PAGE 608)

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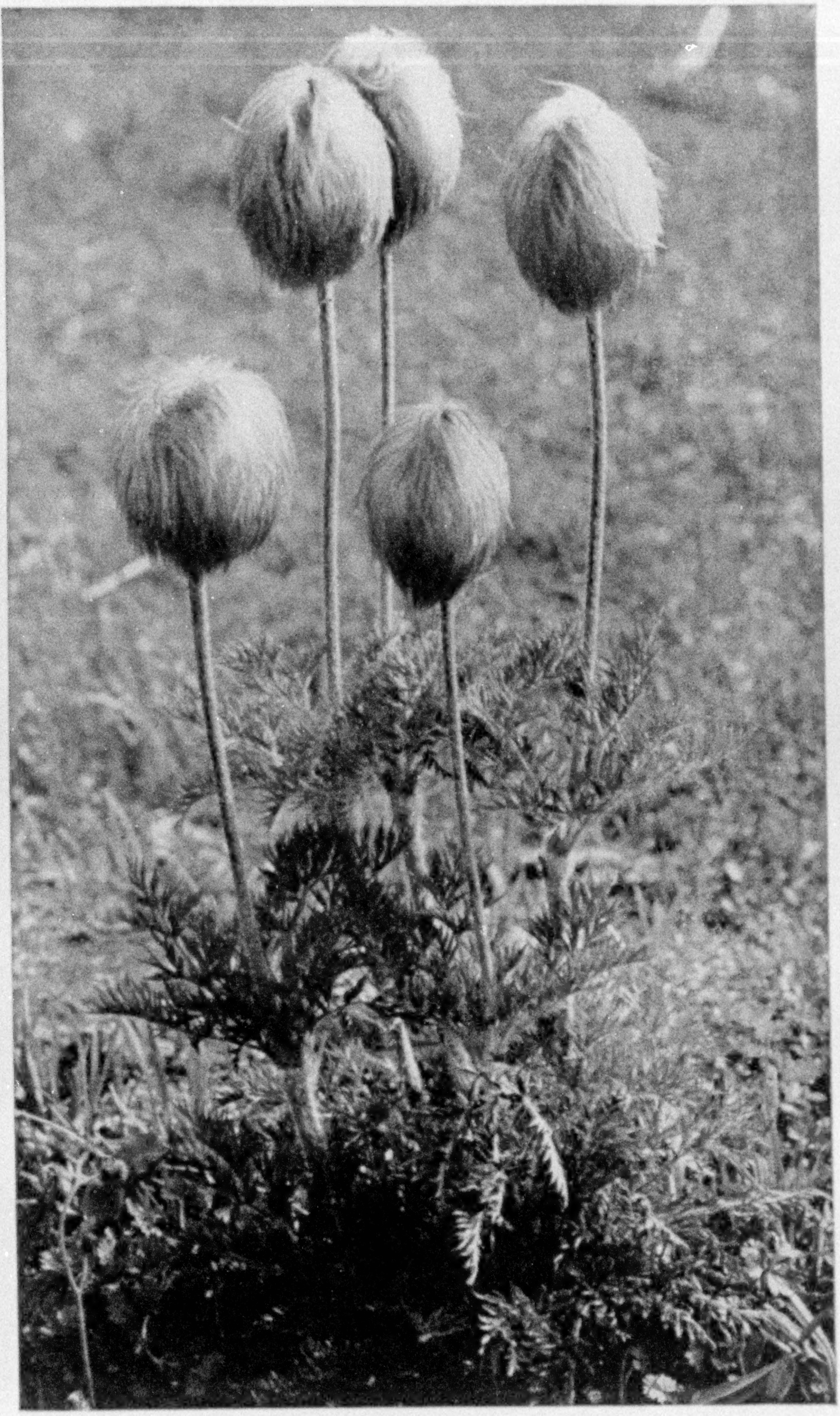

Photo by A. H. Barnes

ANEMONE SEED PLUMES (SEE PAGES 607-608)

Photo by A. H. Barnes

ANEMONE IN MOUNT RAINIER NATIONAL PARK

ing close to the ground, adorns the rocky ridges with small flowers of white and delicate lavender. One other form of the aster, with its deep yellow centers and delicately tinted petals, grows in abundance o'er vale and slope, like a pleasant smile in an Alpine wild; and also many other mountain beauties with all the splendor of a Burbank masterpiece.

The first white man to visit the mountain was Dr. Wm. F. Tolme, of the Hudson Bay Company, from Fort Nisqually, who in 1833 closely approached some of its glaciers. Gen. A. V. Kautz, in 1857, made an attack of the mountain, but it has never been affirmed that he reached the true summit. In 1870 Messrs. Van Trump and Stevens succeeded in reaching the summit of the highest peak.

The Rainier Park was not much visited until the last three seasons. In 1911 upwards of 11,000 tourists registered at the park entrance. Since the days of early travel by pony and stage have given place to railway and auto, the tourist can make the journey from Seattle or Tacoma to the mountain snow-line in a few hours' drive.

A look at the great white mountain, rosy at early dawn, white at noon, changing back to warm glow at the close of day, has ever been a power to uplift; but

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Photo by A. H. Barnes

MOUNTAIN MEADOW ASTERS: MOUNT RAINIER (SEE PAGE 607)

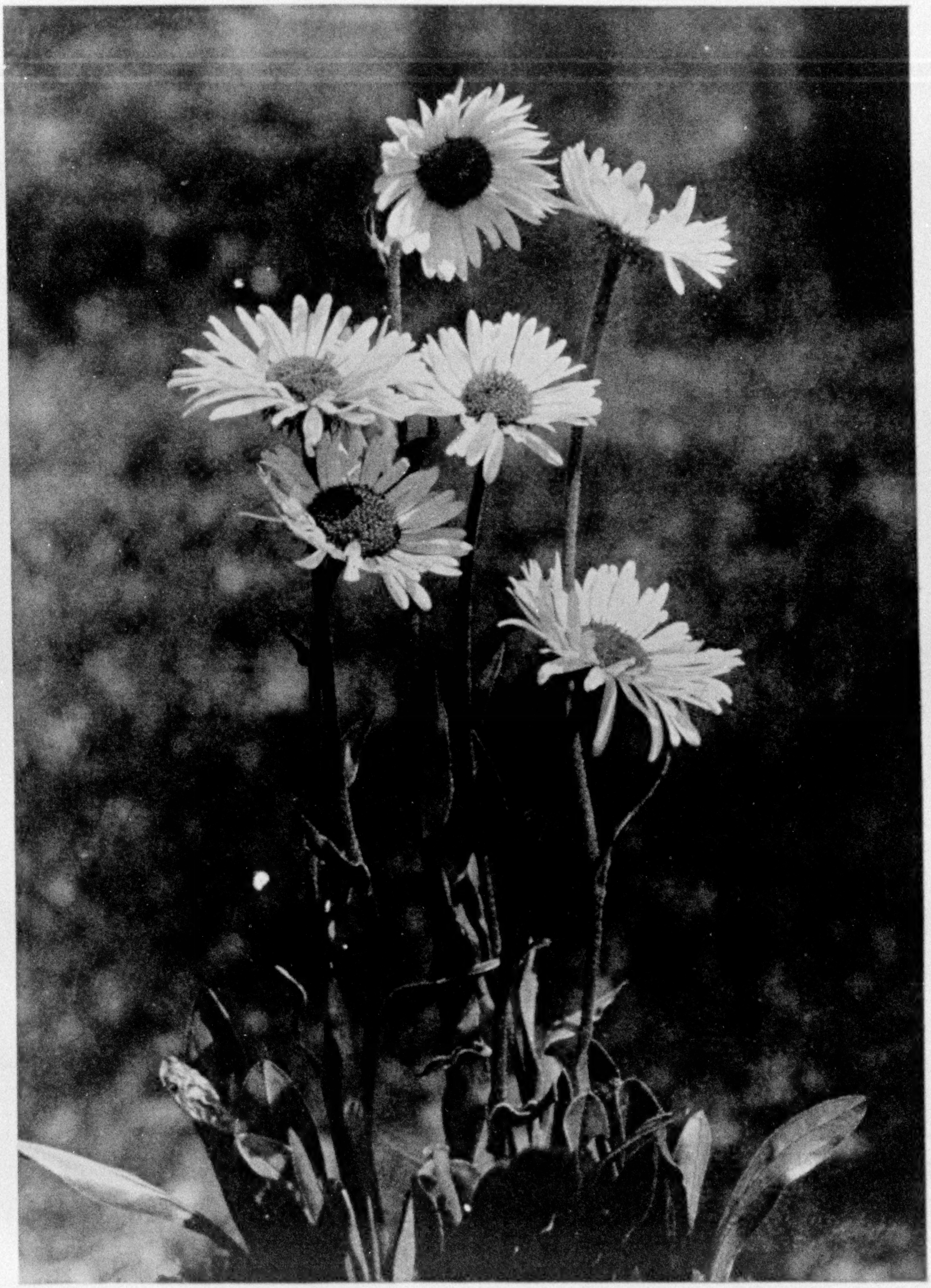

Photo by A. H. Barnes

A SPECIMEN OF THE MOUNTAIN ASTER (SEE PAGE 607)

XUM

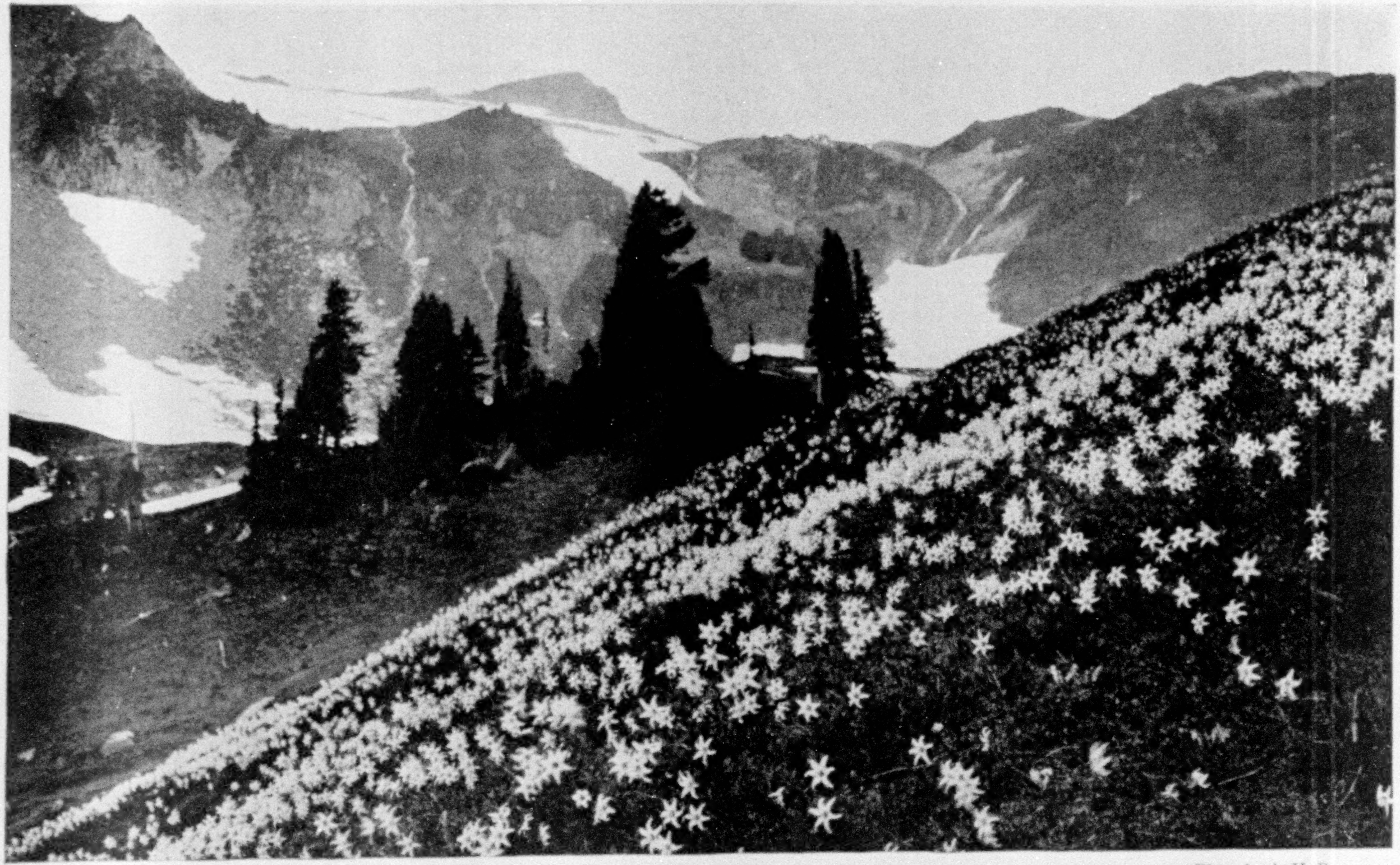

Photo by A. H. Barnes

AVALANCHE LILY SLOPE: IN RAINIER NATIONAL PARK (SEE PAGE 608) the students of nature, like the musician, experience more than they express.

Photo by A. H. Barnes

AVALANCHE OR DEER'S-TONGUE LILY

The first writer to give detailed expression of enthusiasm about the mountain was Theodore Winthrop, in his book "Canoe and Saddle." After a voyage of more than 100 miles in a canoe paddled by Indians, Mr. Winthrop, in 1853, rounded a point at the entrance of the present Tacoma Harbor in full view of the mountain.

"We had rounded a point and opened Puyallup Bay, a breadth of sheltered calmness, when I, lifting sleepy eyelids for a dreamy stare about, was suddenly aware of a vast white mountain dome of snow swelling and seeming to fill the aërial spheres as its image displaced the deeps of tranquil waters. . . . Kingly and alone stood this majesty, without any visible comrade or consort, though far to the north and south its brethren and sisters dominated their realms, each in isolated sovereignty rising above the pine-darkened sierra of the Cascade Mountains. . . . Of all the peaks from California to Frazer's River, this one before me was royalest. Mount Rainier, white men have dubbed it, perpetually the name of somebody or nobody; more melodiously, the Indians call it Tacoma."

Again Mr. Winthrop expresses himself from his saddle, while riding toward the mountains: "I had been following thus for hours the blind path—harsh, darksome, and utterly lonely—urging on with no outlook, encountering no landmark. . . . As I looked across the solemn surges of forests, suddenly above their somber green appeared Tacoma. Large and neighbor it stood, so near that every jewel of its snow fields seemed to send me a separate ray, yet not so near but that I could with one look take in its whole image, from clear-cut edge to edge."

Mr. Winthrop pictured almost exactly the condition of the world-old fires, at the present day not entirely lifeless. "If the giant fires had ever burned under that cold summit, they had long since died out. The dome that swelled up had crusted over and then fallen in upon itself. . . . Only the thought of eternal peace arose from this heaven-upbearing, monument-like incense, and, overflowing, filled the world with deep and holy calm." . . .

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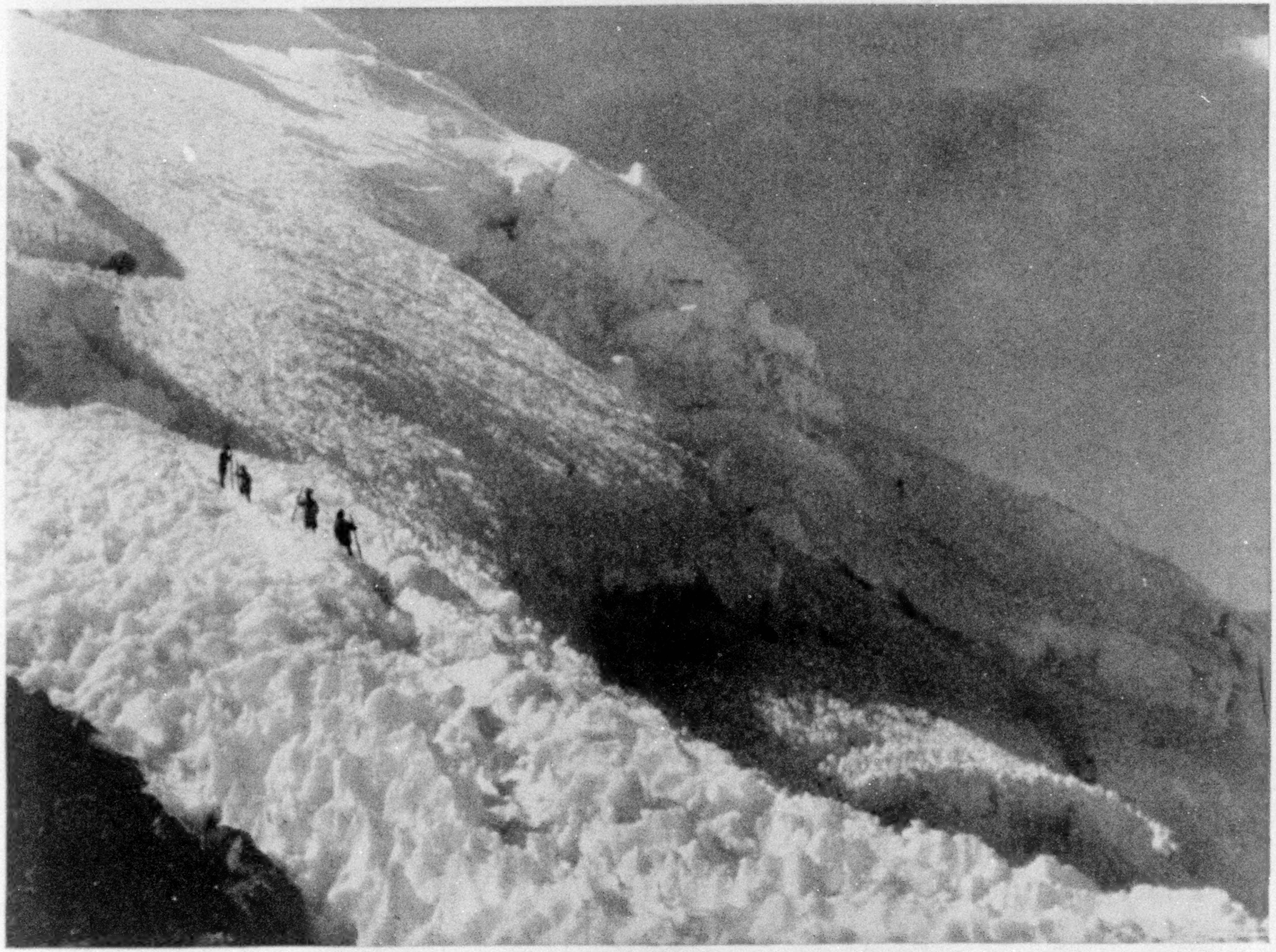


Photo by A. H. Barnes

CLIMBING SOME OF THE UPPER FEEDERS OF THE WHITE RIVER GLACIER, NOT FAR BELOW THE SUMMIT OF MOUNT RAINIER

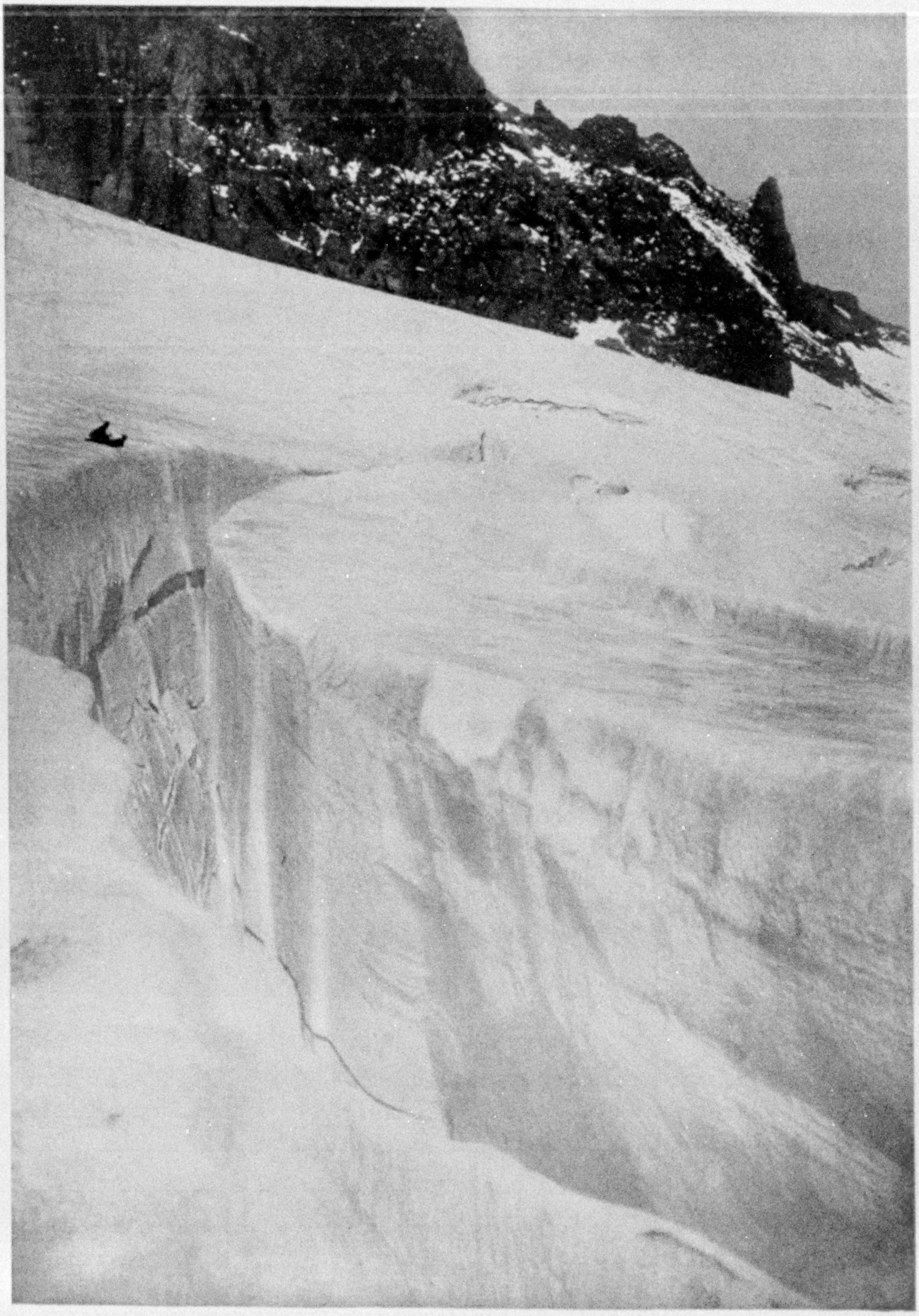


Photo by Charles Bedford, from "The Mountain That Was 'God,'" by John H. Williams: G. P. Putnam's Sons

A PERILOUS POSITION ON THE EDGE OF A GREAT CREVASSE: COWLITZ GLACIER, NEAR END OF CATHEDRAL ROCKS

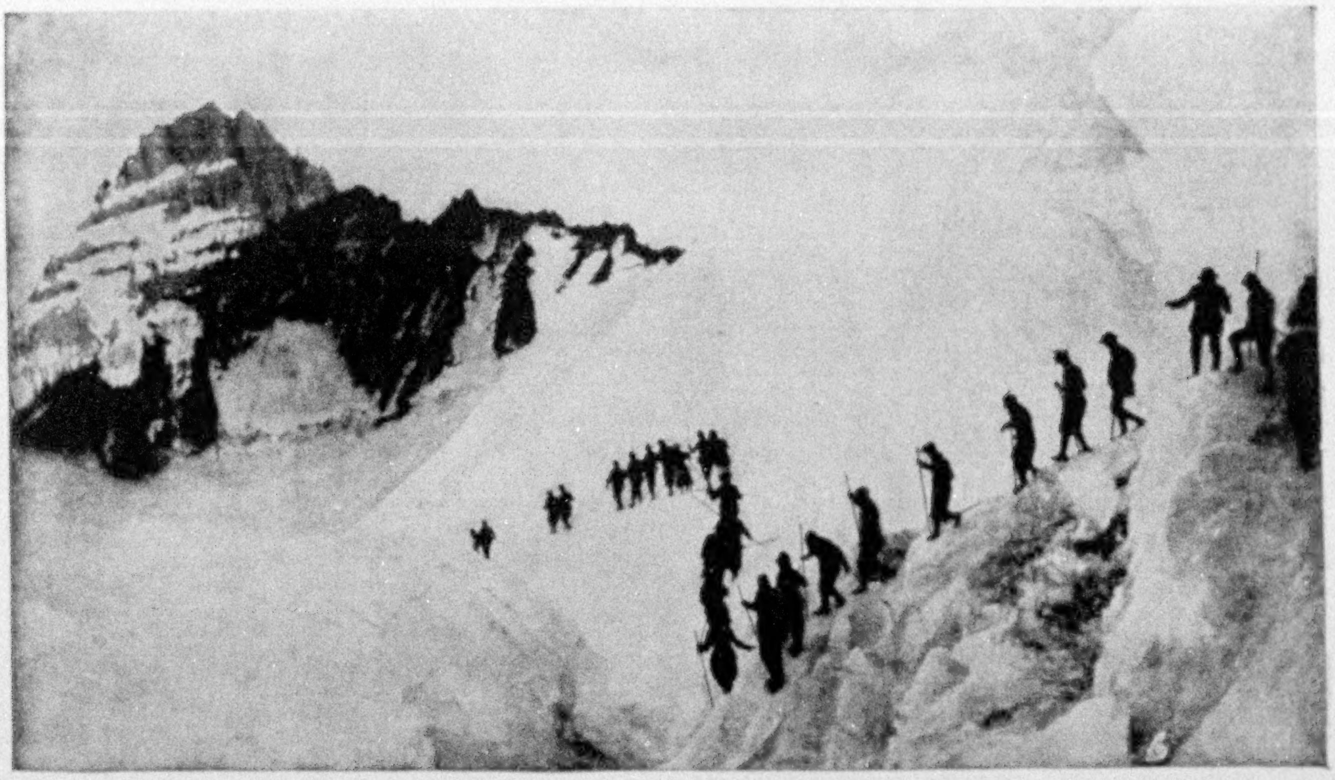
XUM

Photo by B. L. Aldrich, Jr., from "The Mountain That Was 'God,'" by John H. Williams: G. P. Putnam's Sons

MOUNT RAINIER: SEEN FROM PUYALLUP RIVER, NEAR TACOMA

Photo by Asahel Curtis, from "The Mountain That Was 'God,'" by John H. Williams: G. P. Putnam's Sons

LOST TO THE WORLD: 7,500 FEET ABOVE SEA-LEVEL, WITH AN OCEAN OF CLOUD RISING



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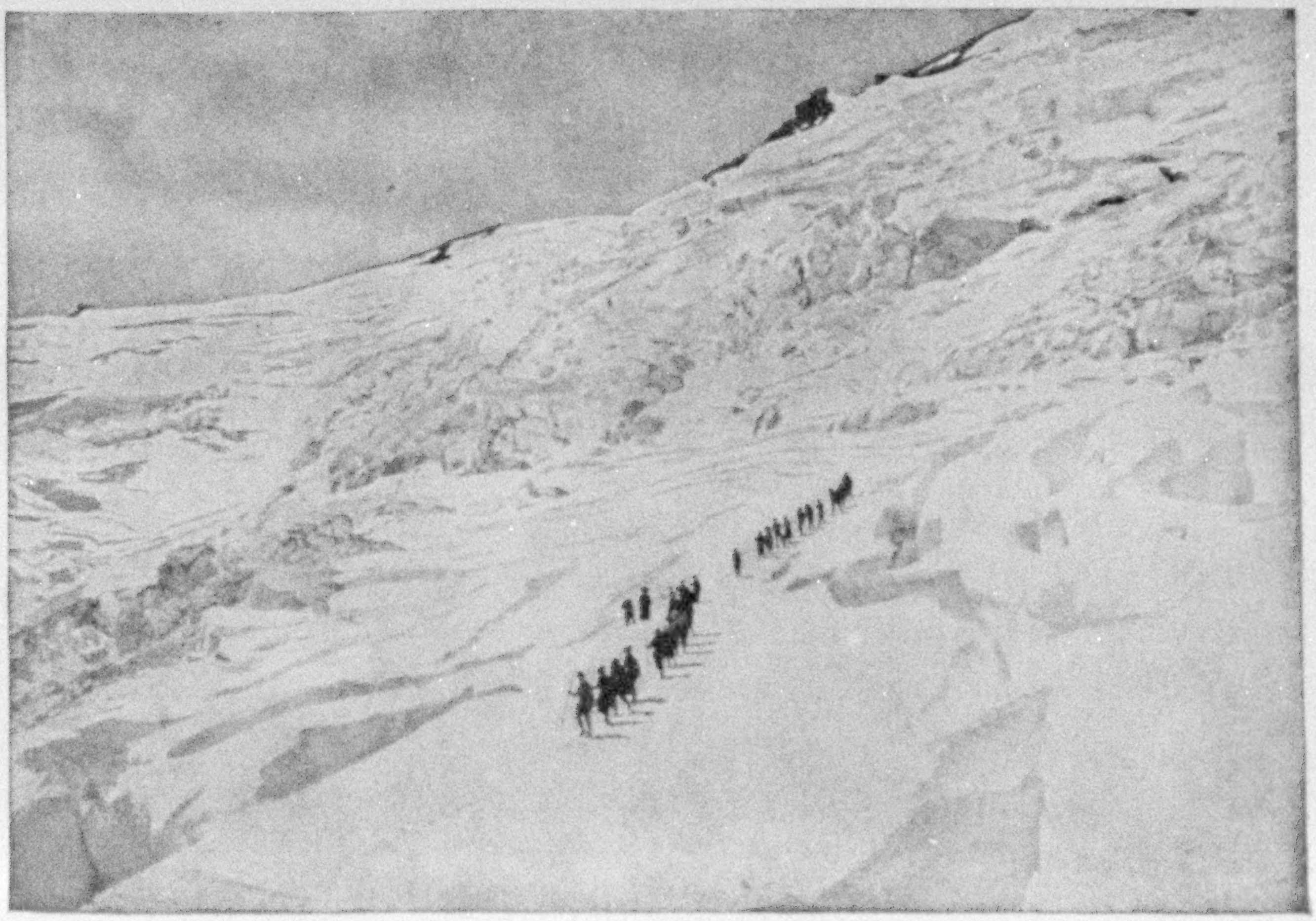
CROSSING A PRECIPITOUS SLOPE ON WHITE GLACIER; LITTLE TAHOMA IN DISTANCE



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THE SIERRA CLUB ON NISQUALLY GLACIER

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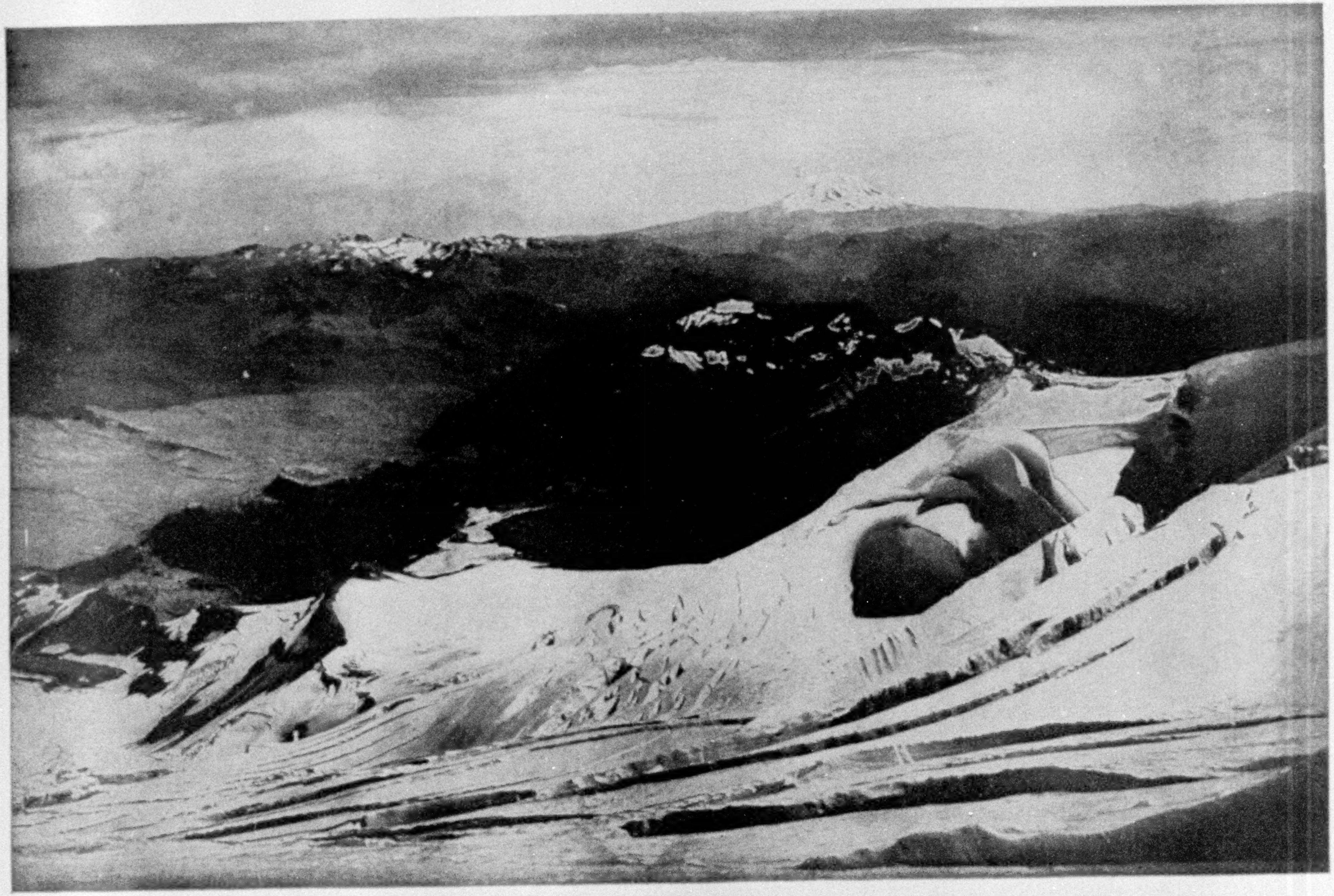

Photo by Charles Bedford, from "The Mountain That Was 'God,'" by John H. Williams: G. P. Putnam's Sons

VIEW SOUTH FROM COWLITZ GLACIER: ELEVATION, 8,000 FEET

Seven miles away are the huge eastern peaks of the Tatoosh. The Cascades beyond break in Cispus Pass and rise on the left to the glacier summits called Goat Peaks. The truncated cone of Mount Adams, more than 40 miles away, crowns the skyline

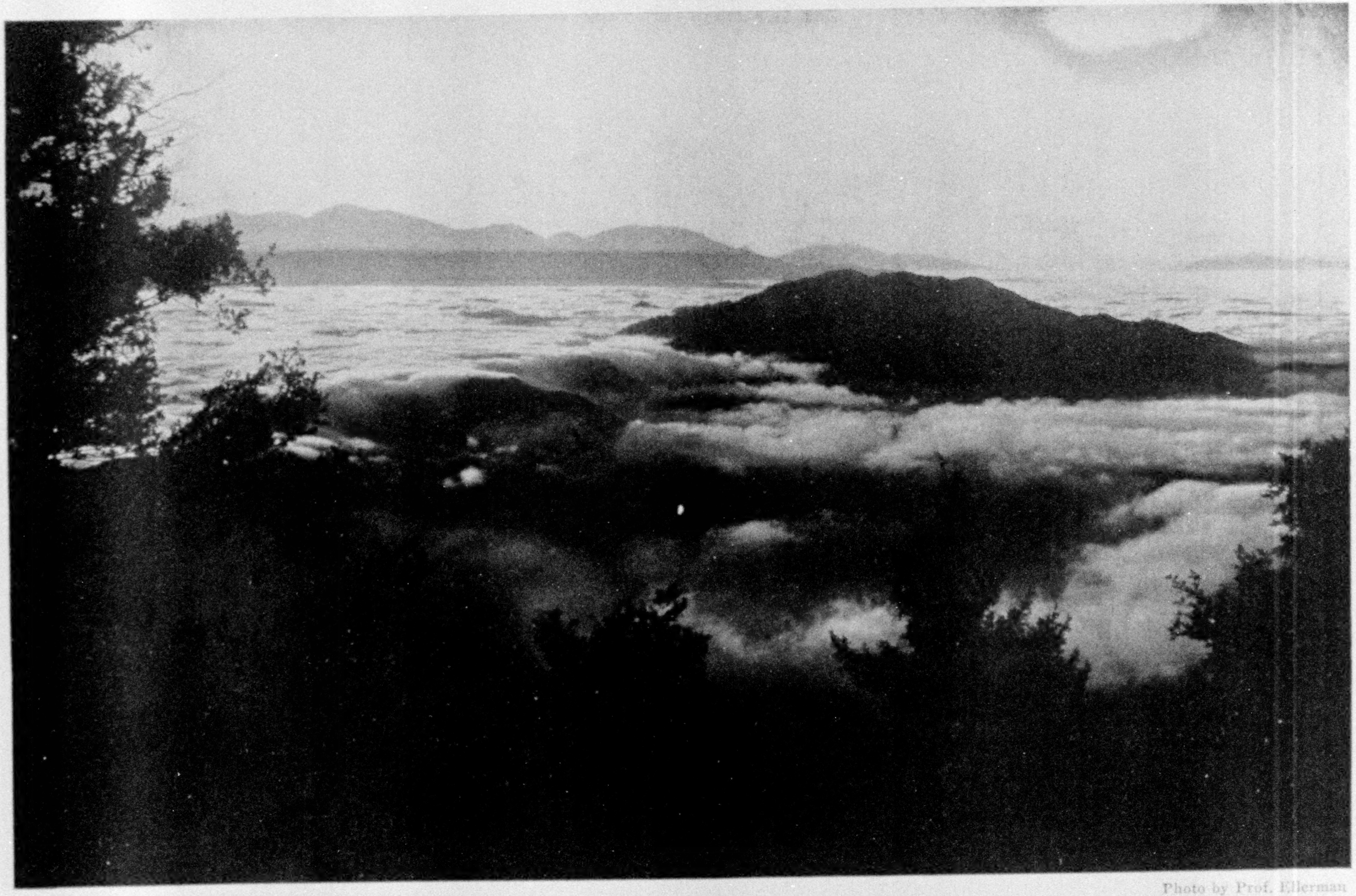

Photo by Prof. Ellerman

AN ISLAND IN AN OCEAN OF CLOUDS; VIEW FROM THE SUMMIT OF MOUNT WILSON, CALIFORNIA

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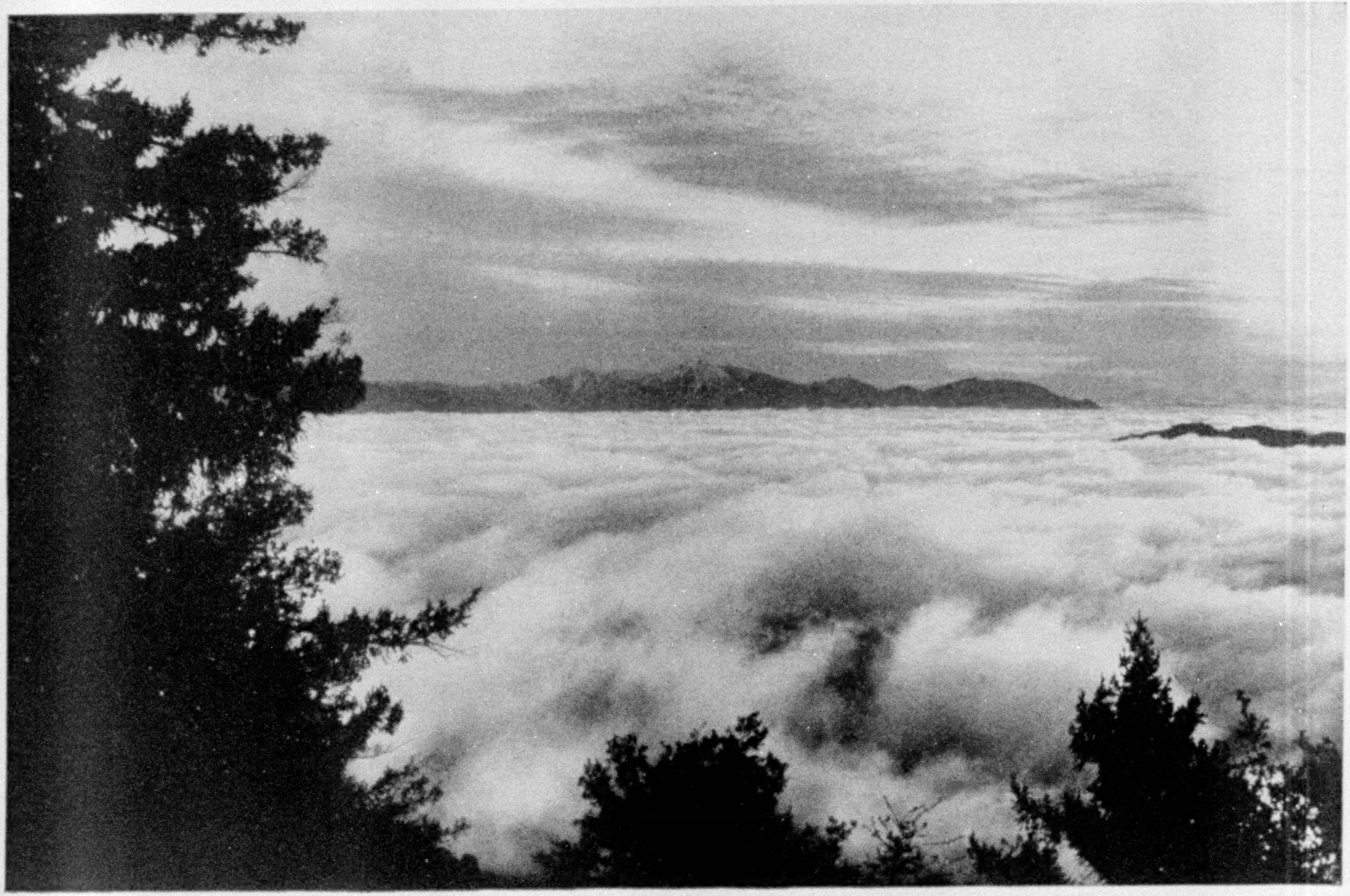

Photo by Prof. Ellerman

A BILLOWY OCEAN OF CLOUDS ENGULFING THE LAND, AS SEEN FROM THE SUMMIT OF MOUNT WILSON, CALIFORNIA

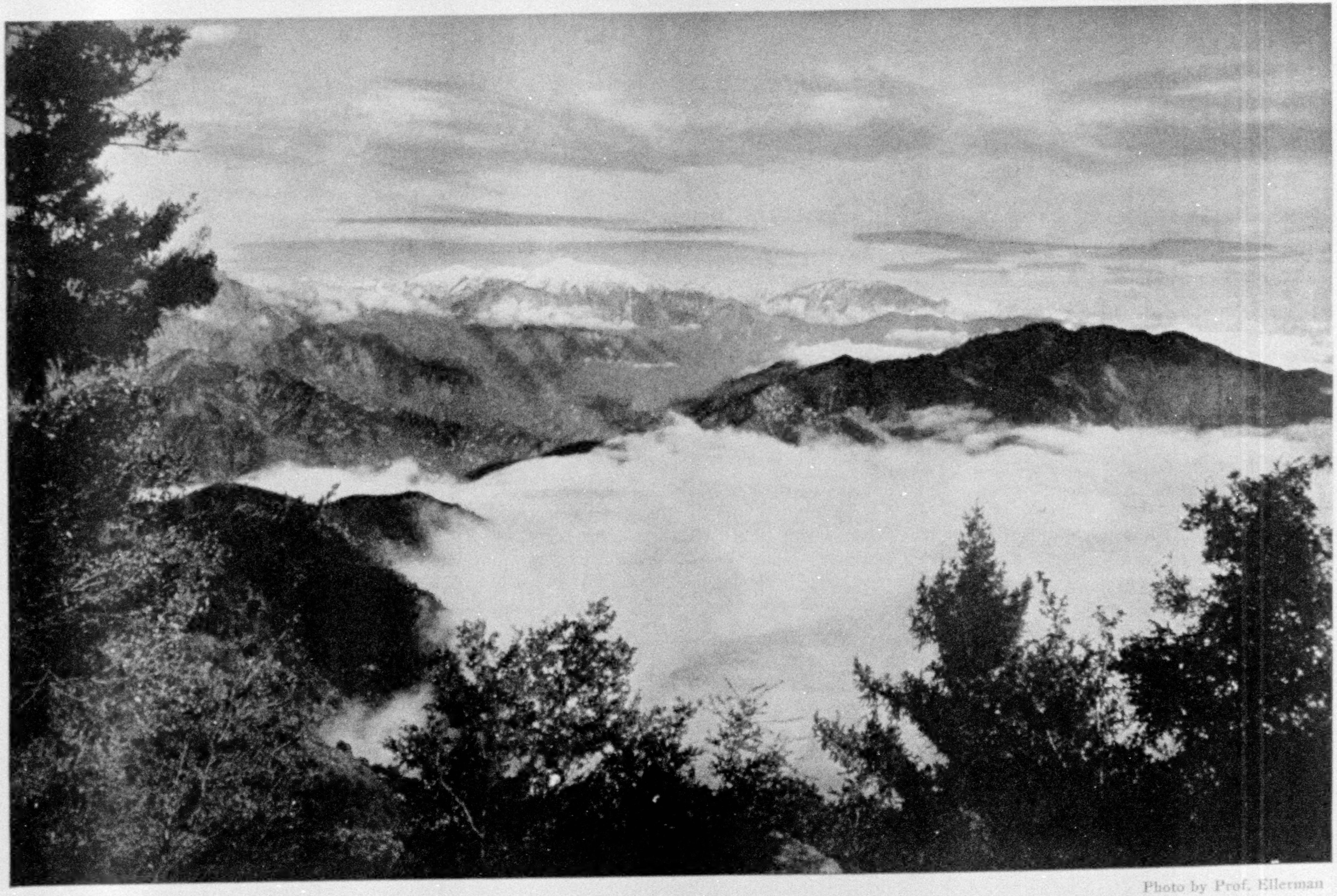

Photo by Prof. Ellerman

FOG FILLING THE VALLEYS, WITH SNOW-CAPPED SAN ANTONIO ("OLD BALDY") IN THE DISTANCE

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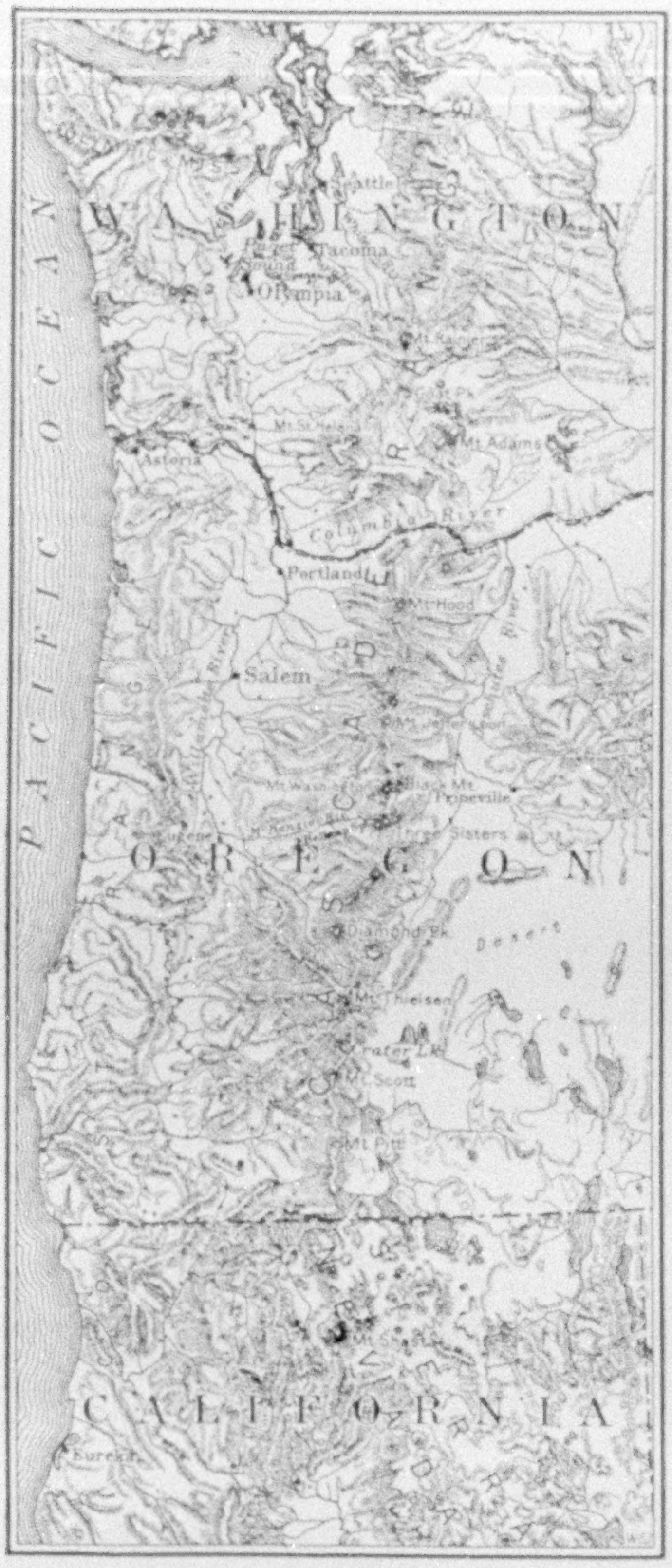
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OUTLINE MAP SHOWING LOCATION OF MOUNT RAINIER

BOOKS ON MOUNT RAINIER

Two beautiful books describing the wonders of Mount Rainier have been published recently. Each is profusely illustrated with photographs, some of them being in colors, and each gives a very vivid picture of the mountain. The first is by Mr. A. H. Barnes, who has given his work the title of "Our Greatest Mountain and Alpine Wonders," while the second is by John H. Williams, "The Mountain That Was 'God.'" Several of the 200 photographs illustrating the latter book are published in this number by courtesy of Mr. Williams. Copies of the books may be obtained from Lowman and Hanford, Seattle, or from the Central News Company, of Tacoma, for 75 cents per copy.

Photo by Mrs. H. A. Towne, from "The Mountain That Was 'God,'" by John H. Williams

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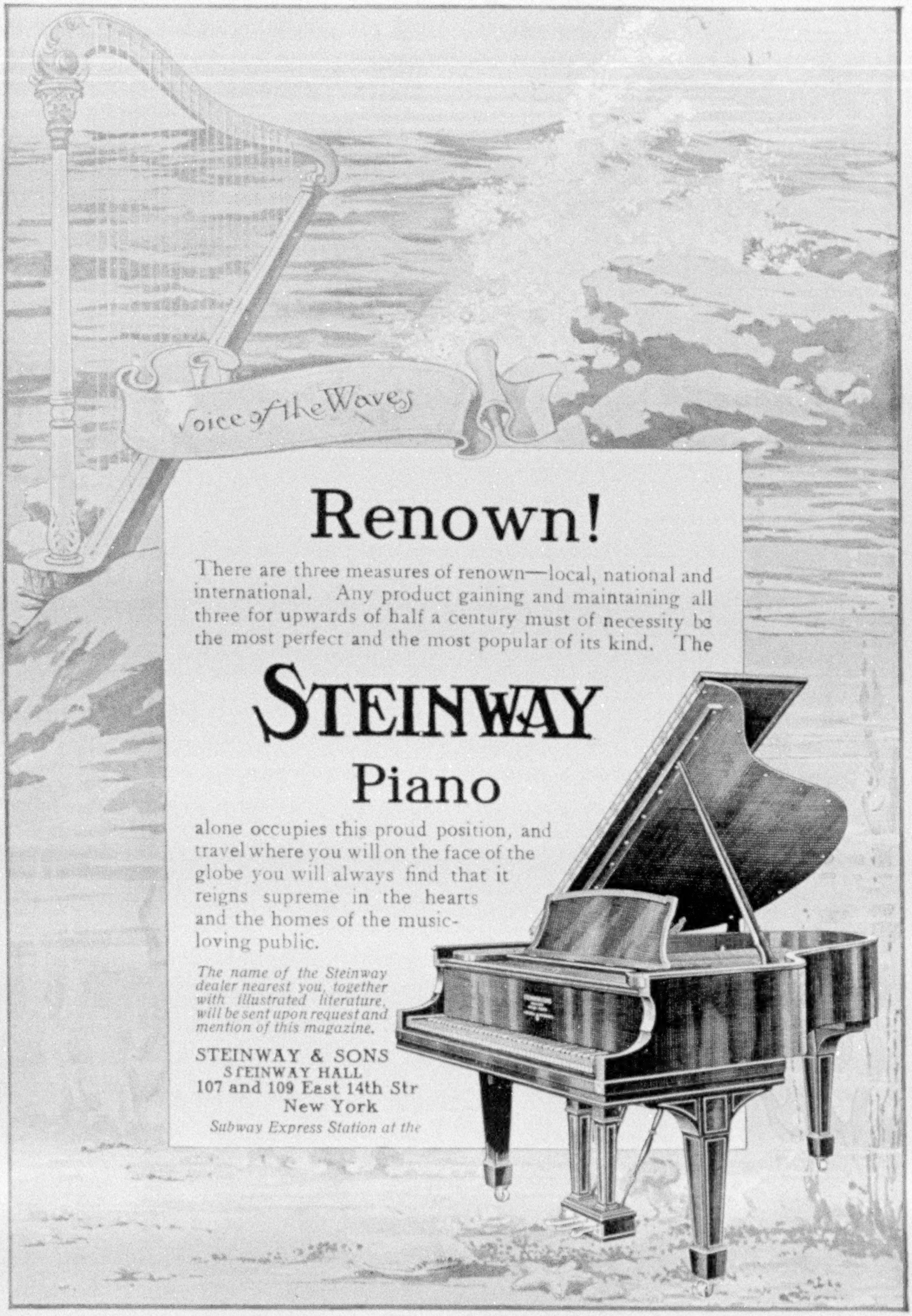

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The Right of All the Way

Railroad service and telephone service have no common factors—they cannot be compared, but present some striking contrasts.

Each telephone message requires the right of all the way over which it is carried. A circuit composed of a pair of wires must be clear from end to end, for a single conversation.

A bird's-eye view of any railroad track would show a procession of trains, one following the other, with intervals of safety between them.

The railroad carries passengers in train loads by wholesale, in a public conveyance, and the service given to each passenger is limited by the necessities of the others; while the telephone carries messages over wires devoted exclusively for the time being to the individual use of the subscriber or patron. Even a multi-millionaire could not afford the exclusive use of the railroad track between New York and Chicago. But the telephone user has the whole track and the right of all the way, so long as he desires it.

It is an easy matter to transport 15,000 people over a single track between two points in twenty-four hours. To transport the voices of 15,000 people over a single two-wire circuit, allowing three minutes for each talk, would take more than thirty days.

The telephone system cannot put on more cars or run extra trains in order to carry more people. It must build more telephone tracks—string more wires.

The wonder of telephone development lies in the fact that the Bell System is so constructed and equipped that an exclusive right of all the way, between near-by or distant points, is economically used by over 24,000,000 people every day.

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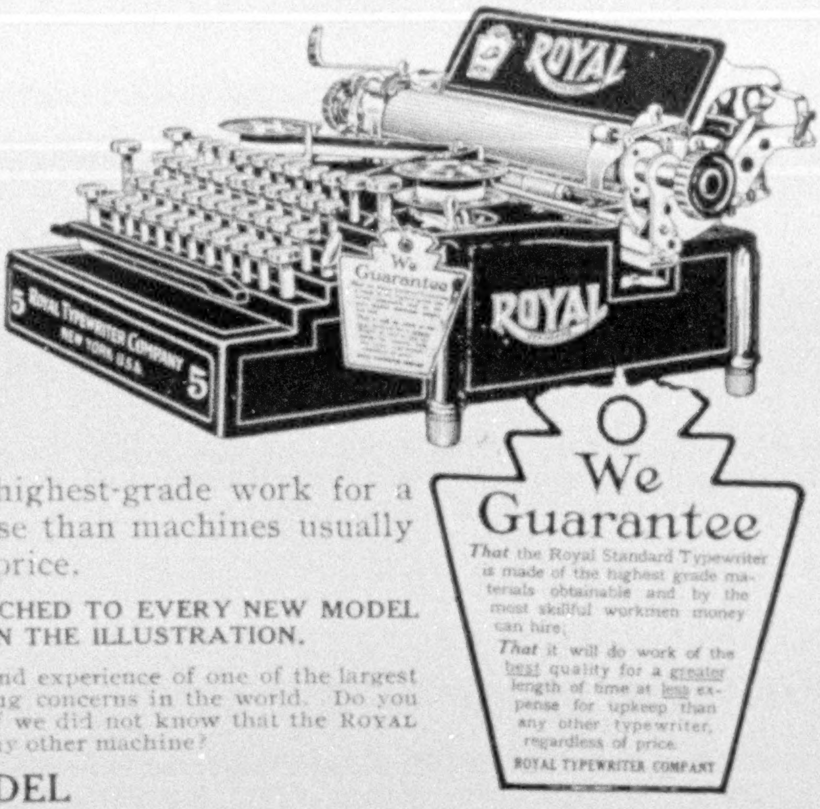

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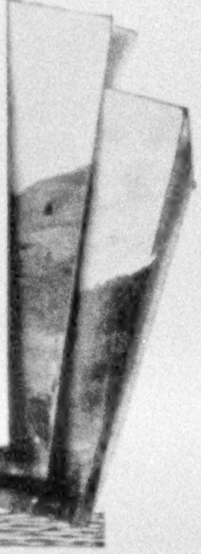
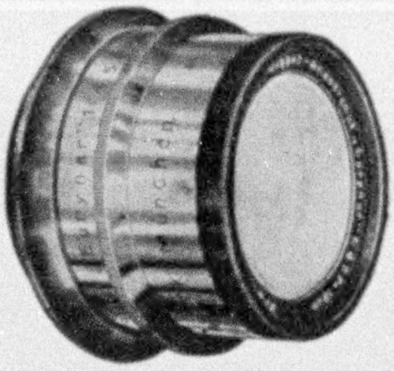


Rock Island



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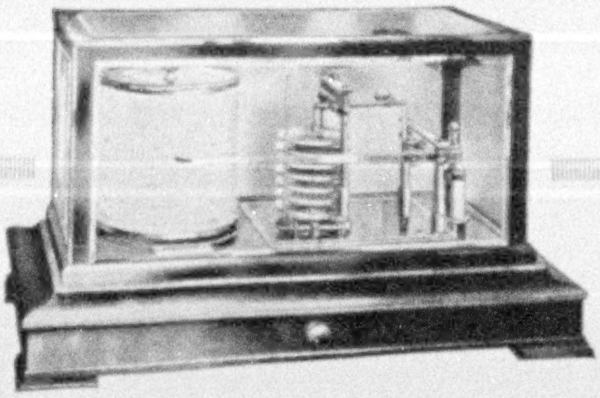

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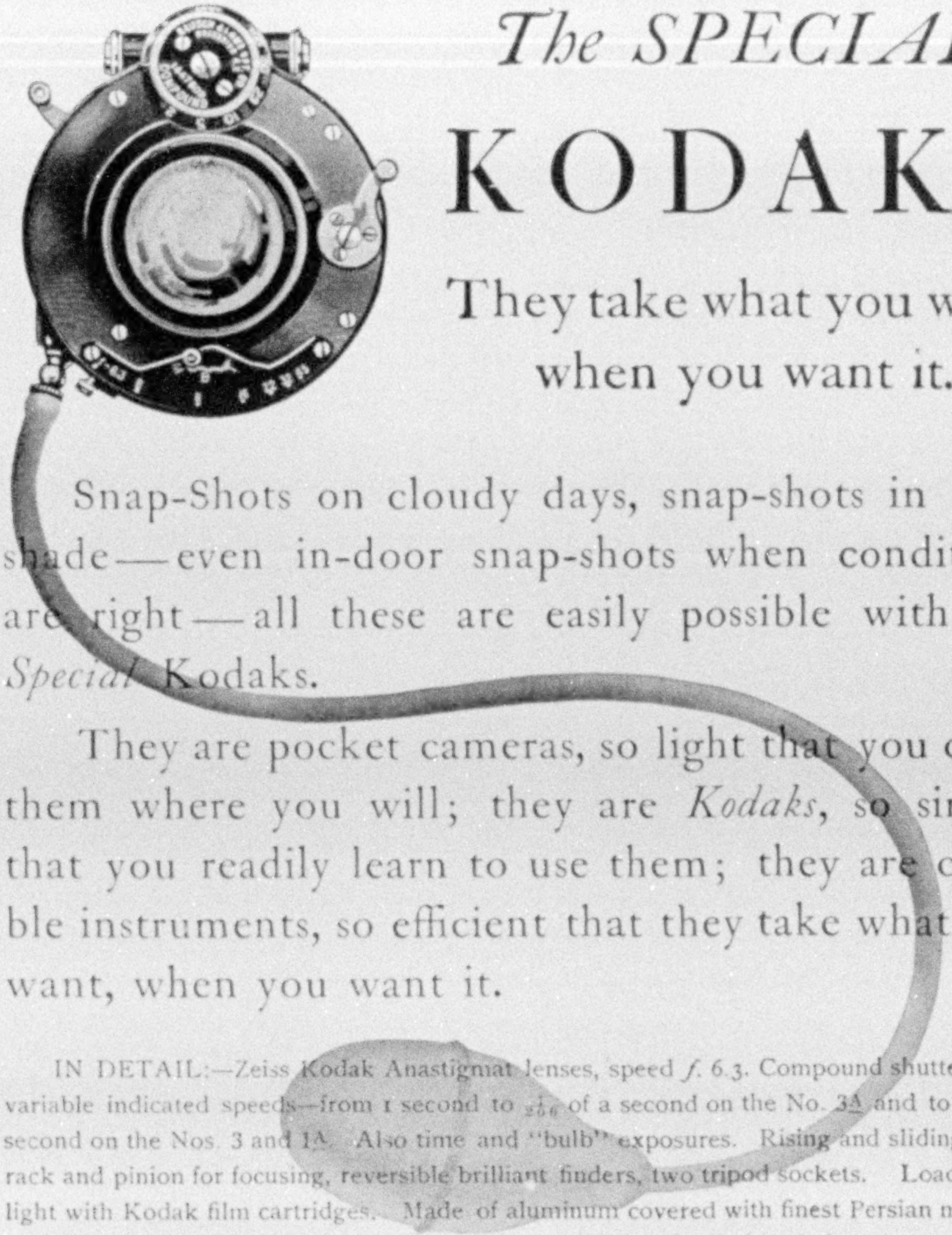

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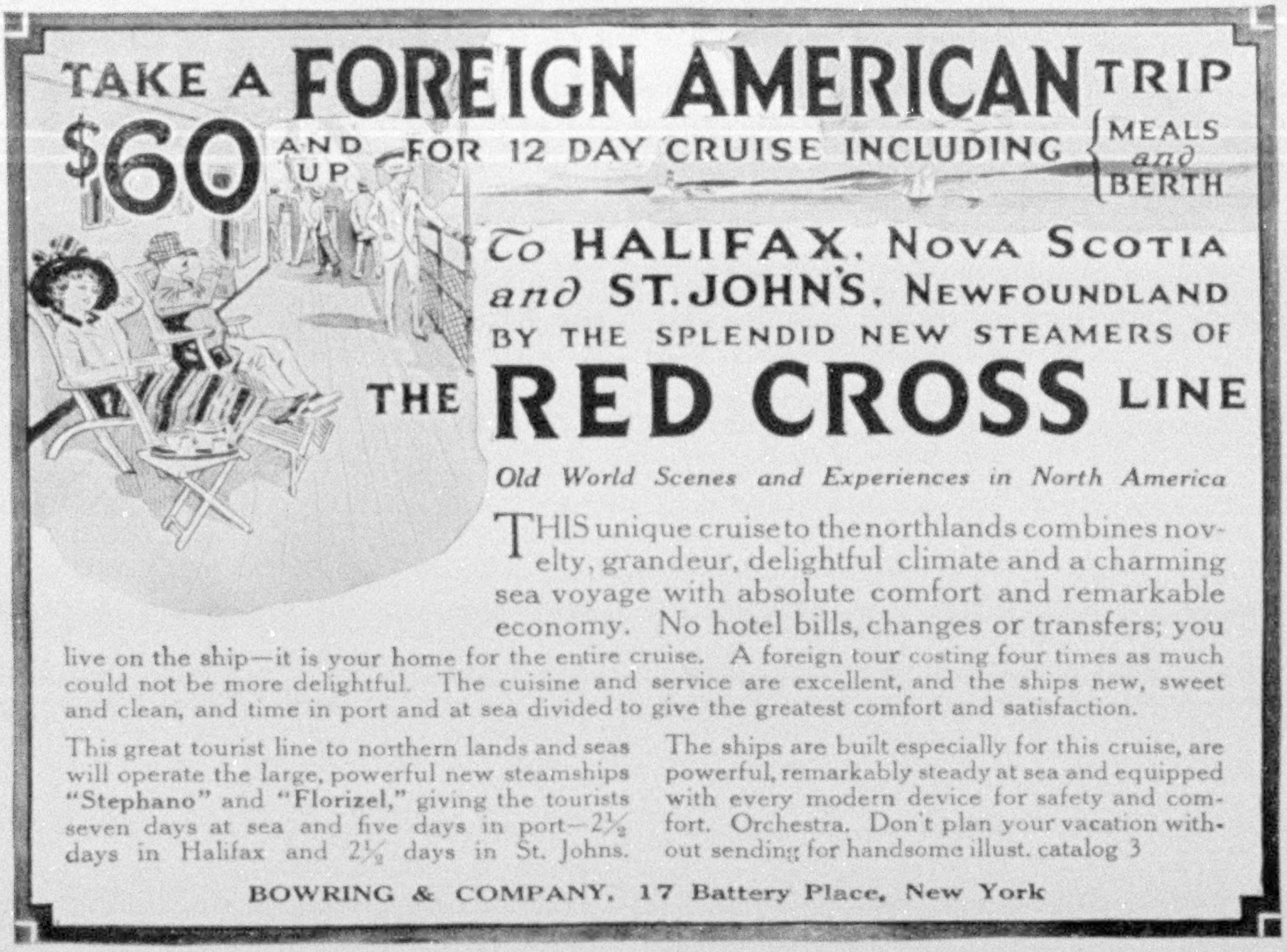

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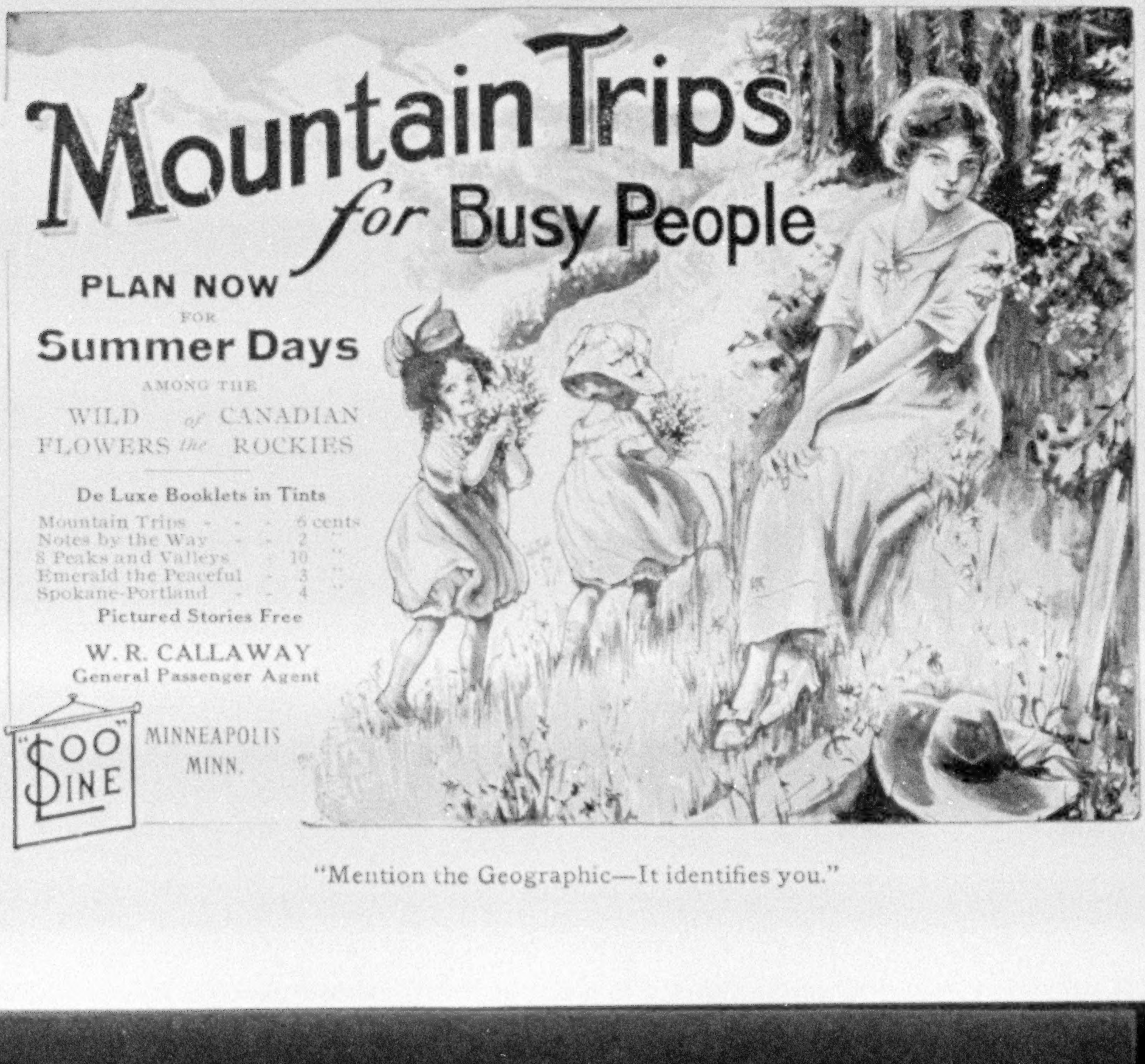

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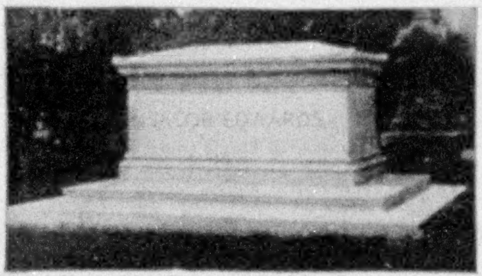

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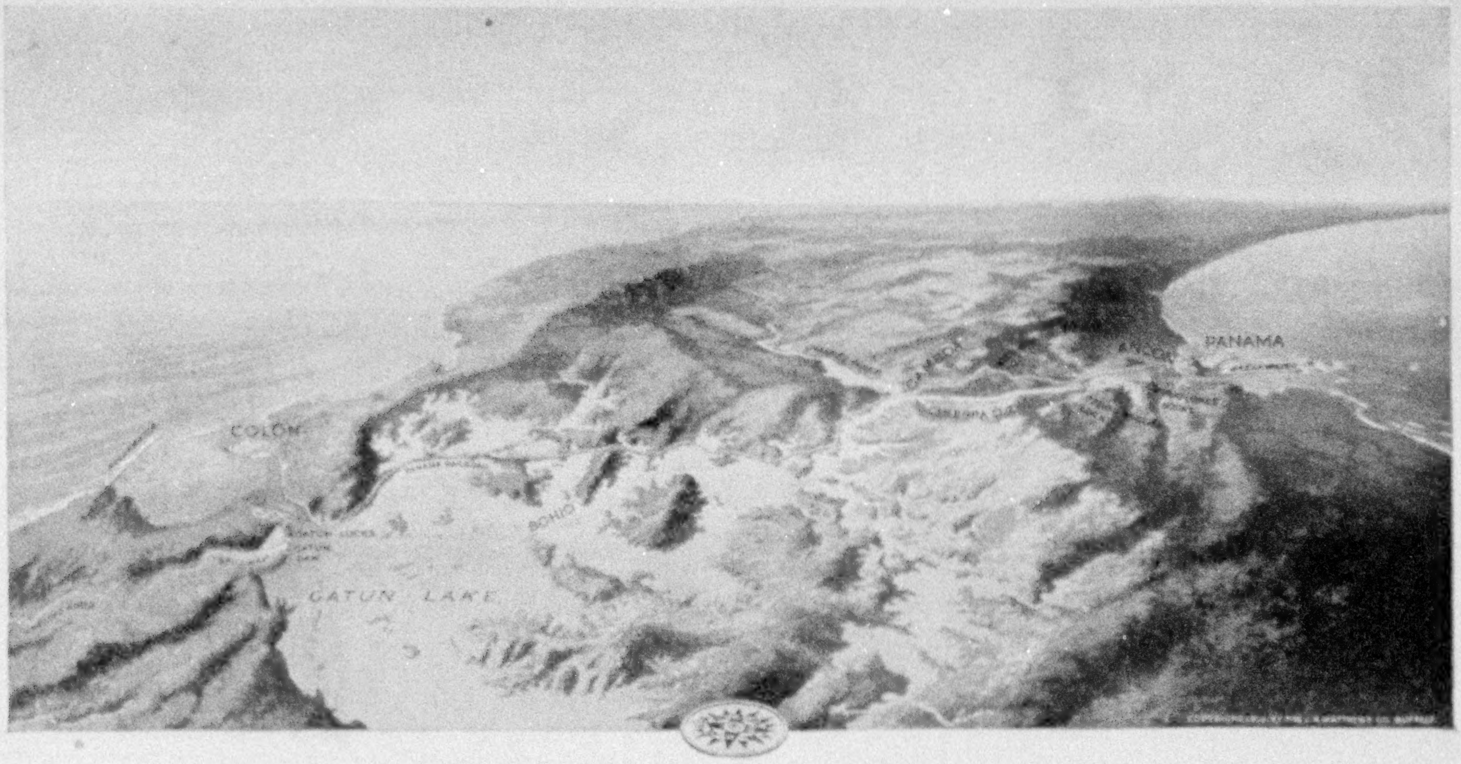

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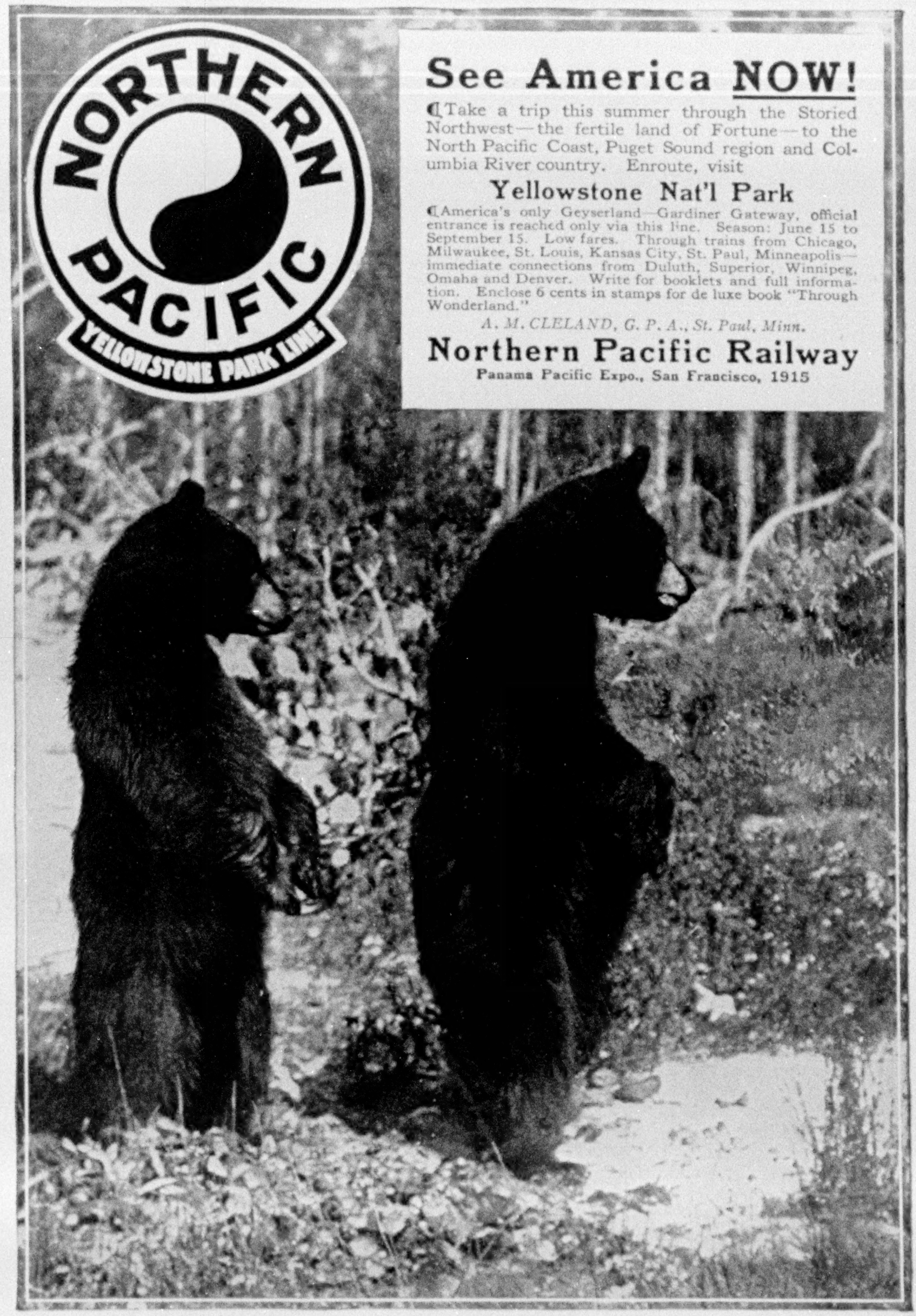

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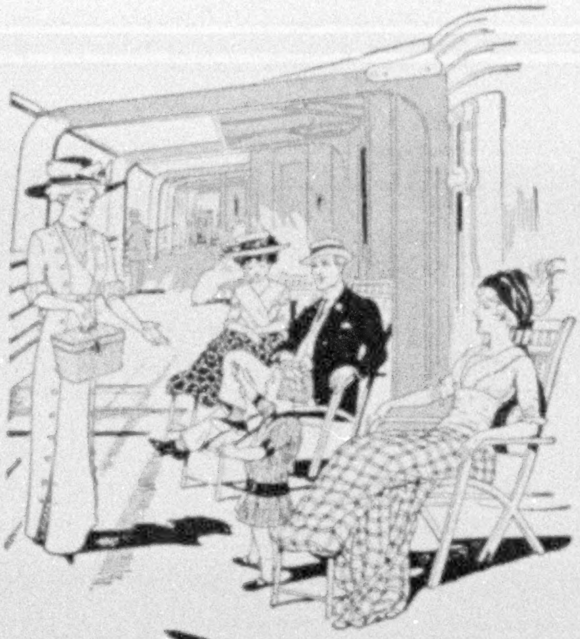

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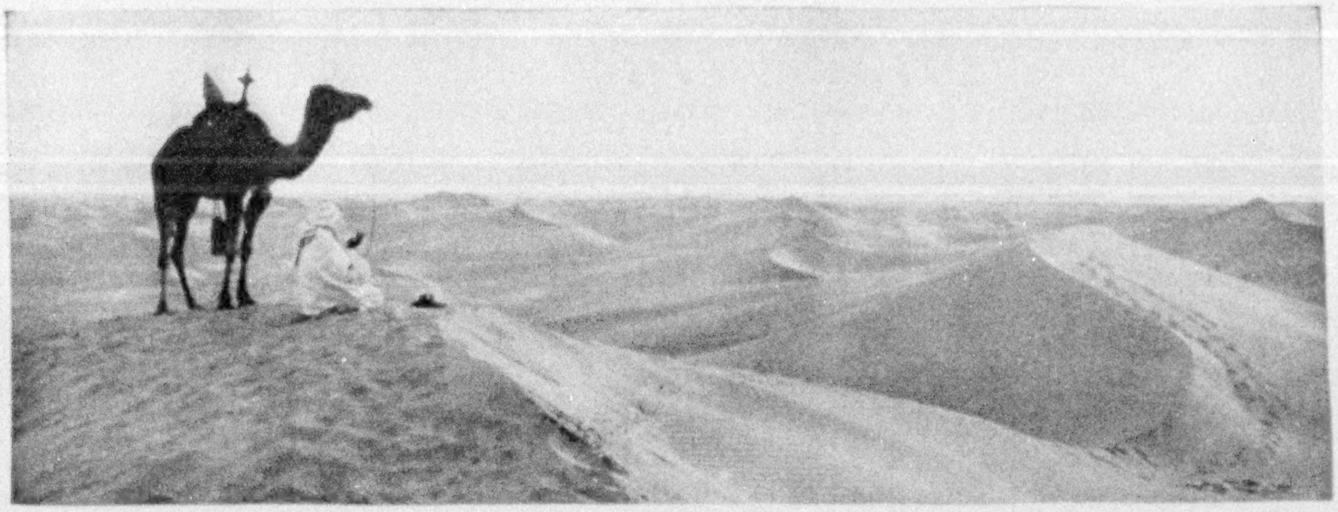

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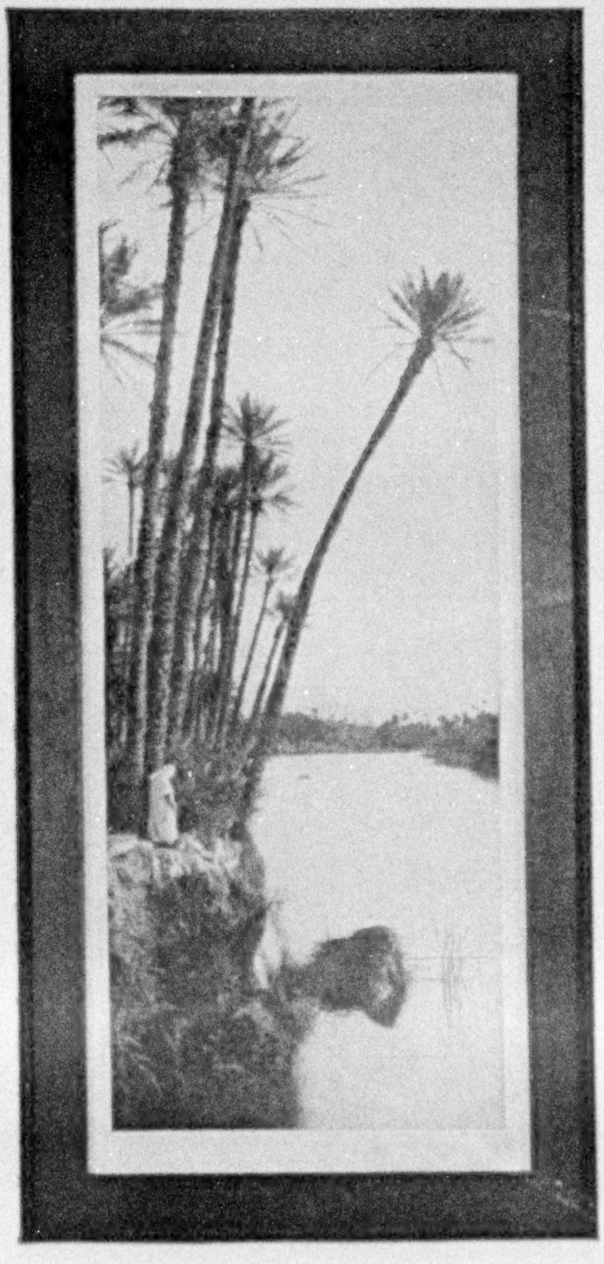

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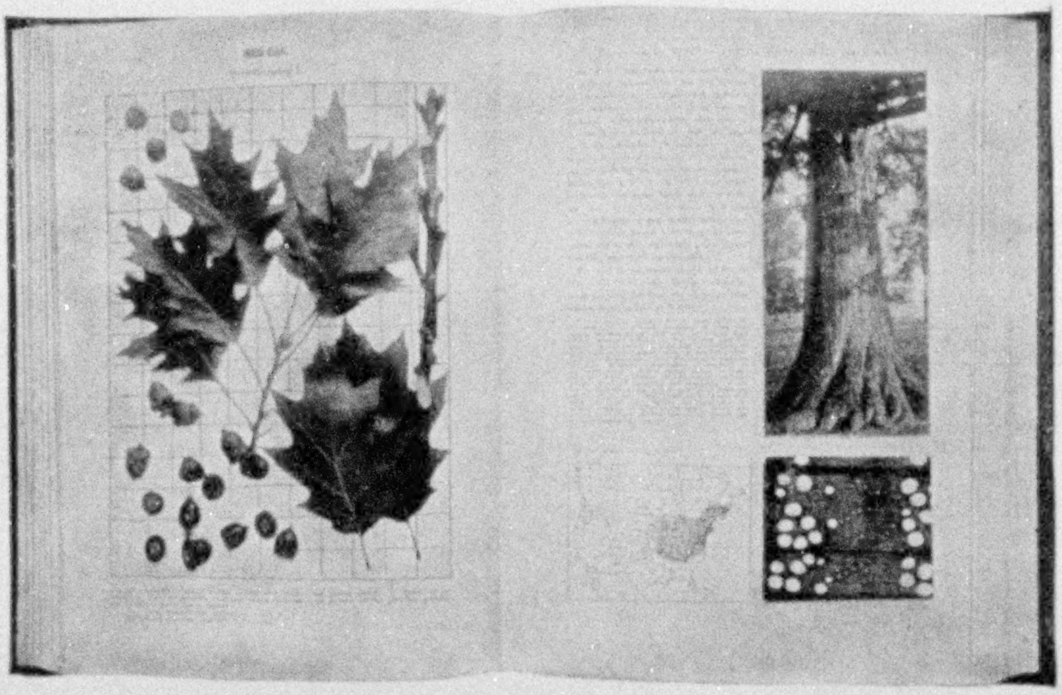

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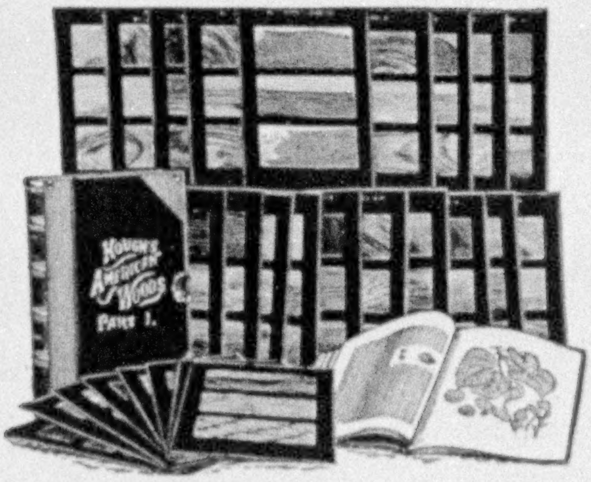

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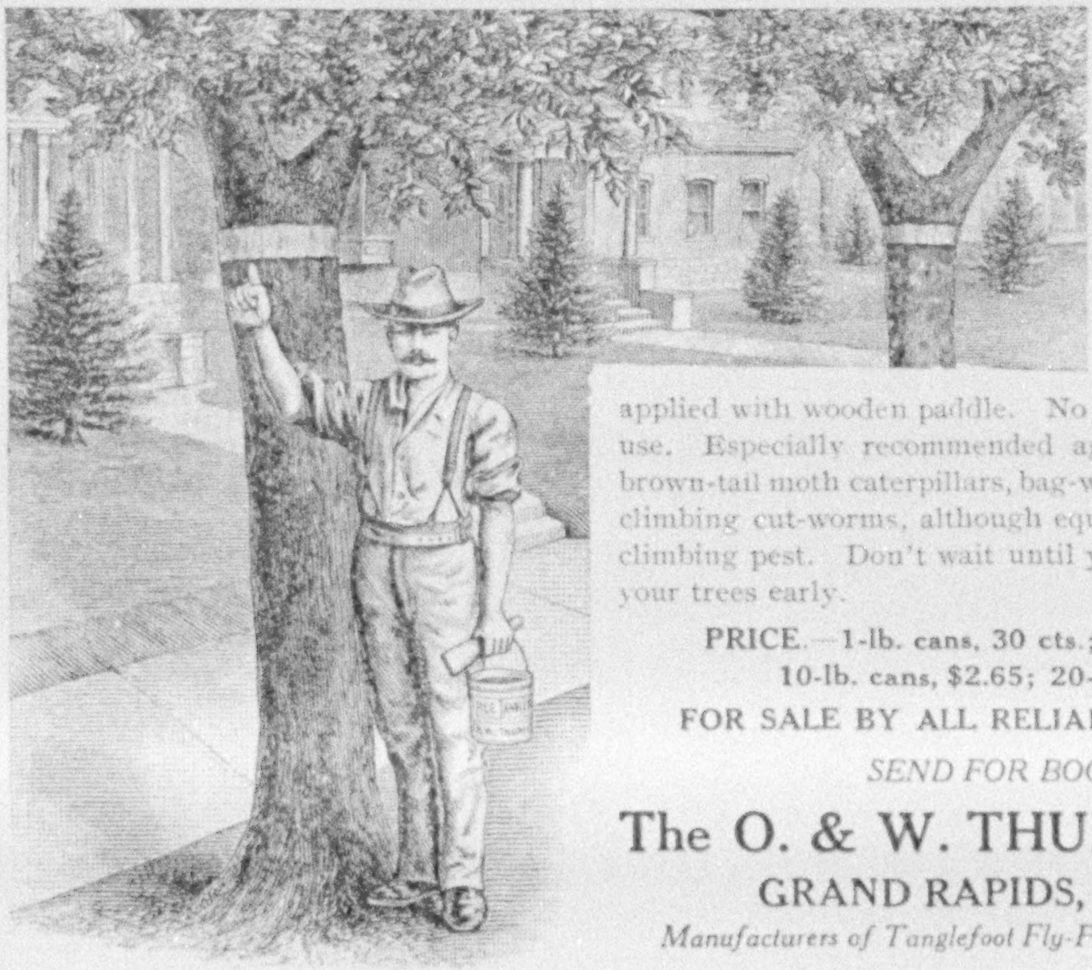

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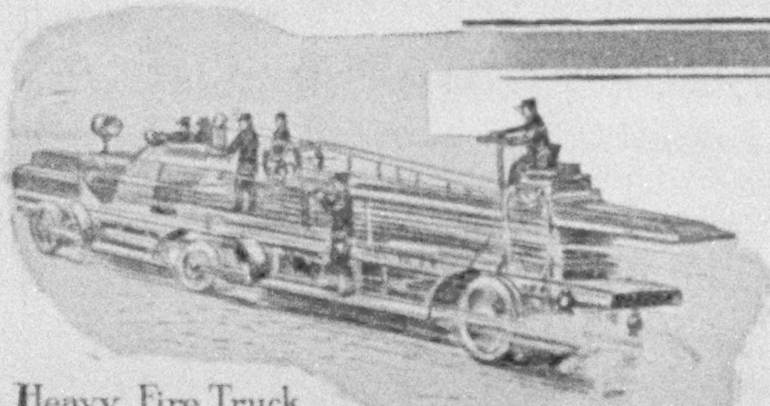

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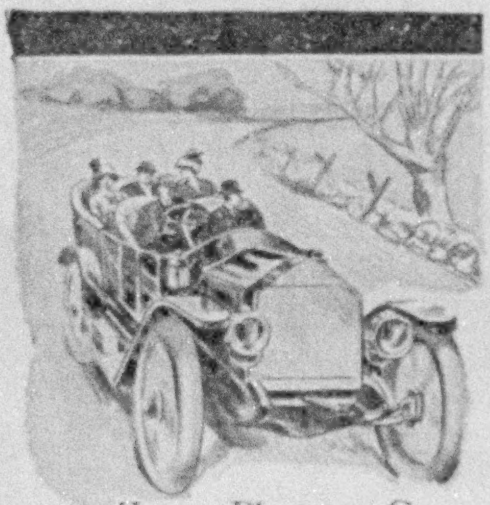


Heavy Pleasure Car

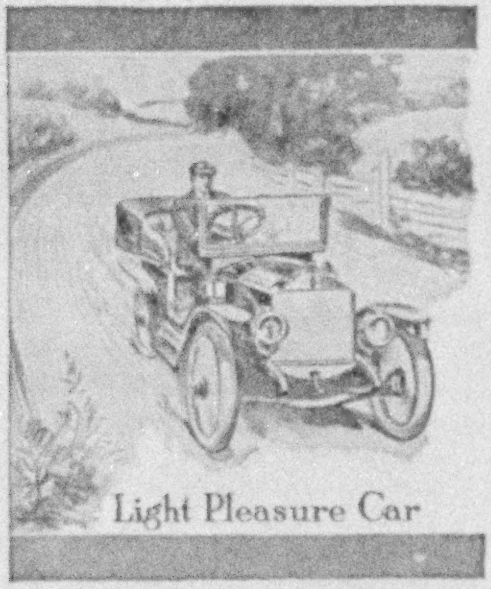
Tests in Hook and Ladder Fire Truck at Factory

Three oils used in this test. Competitors' oils indicated by letters "A" and "B." Conditions under which oils were tested exactly the same except that at the beginning of third test, that of Texaco Motor Oil, motor was badly overheated due to the two tests that had preceded. Motor cooled during the test of Texaco Motor Oil. About ten minutes intervened between first and second and second and third tests. For the purpose of the test a long, very steep hill was used. Truck was sent at it from a standing start.

Oil used	"A"	"B"	Texaco
Distance run	¾ way up hill. Motor stalled. Truck backed down under brakes.	½ way up hill. Motor stalled. Truck backed down under brakes.	To top of hill. Truck turned and descended with motor running.
Condition of motor beginning of test	Perfect	Overheated	Badly Overheated.
Condition of motor end of test	Overheated	Badly Overheated	*Good*
Saving in Oil consumption	None	None	25%

Tests in "Cadillac" and "Winton Six"

	In "Cadillac"	In "Winton"
Oil used	Texaco	Texaco
Duration of use	*Two years*	One year
Distance traveled, miles	5,000	20,000
Condition of motor, beginning	Perfect	Perfect
Condition of motor, end	*Perfect*	*Perfect*
Repairs of motor	*None*	*None*
Carbon deposit	*None*	*None*
Cleaning of spark plugs	*None*	*None*



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